This is a digital copy of a book that was preserved for generations on library shelves before it was carefully scanned by Google as part of a project to make the world's books discoverable online.

It has survived long enough for the copyright to expire and the book to enter the public domain. A public domain book is one that was never subject to copyright or whose legal copyright term has expired. Whether a book is in the public domain may vary country to country. Public domain books are our gateways to the past, representing a wealth of history, culture and knowledge that's often difficult to discover.

Marks, notations and other marginalia present in the original volume will appear in this file - a reminder of this book's long journey from the publisher to a library and finally to you.

**Usage guidelines**

Google is proud to partner with libraries to digitize public domain materials and make them widely accessible. Public domain books belong to the public and we are merely their custodians. Nevertheless, this work is expensive, so in order to keep providing this resource, we have taken steps to prevent abuse by commercial parties, including placing technical restrictions on automated querying.

We also ask that you:

+ *Make non-commercial use of the files* We designed Google Book Search for use by individuals, and we request that you use these files for personal, non-commercial purposes.

+ *Refrain from automated querying* Do not send automated queries of any sort to Google's system: If you are conducting research on machine translation, optical character recognition or other areas where access to a large amount of text is helpful, please contact us. We encourage the use of public domain materials for these purposes and may be able to help.

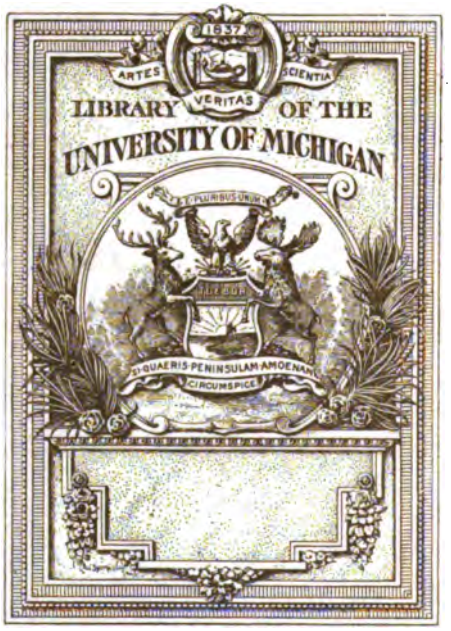
+ *Maintain attribution* The Google "watermark" you see on each file is essential for informing people about this project and helping them find additional materials through Google Book Search. Please do not remove it.

+ *Keep it legal* Whatever your use, remember that you are responsible for ensuring that what you are doing is legal. Do not assume that just because we believe a book is in the public domain for users in the United States, that the work is also in the public domain for users in other countries. Whether a book is still in copyright varies from country to country, and we can't offer guidance on whether any specific use of any specific book is allowed. Please do not assume that a book's appearance in Google Book Search means it can be used in any manner anywhere in the world. Copyright infringement liability can be quite severe.

**About Google Book Search**

Google's mission is to organize the world's information and to make it universally accessible and useful. Google Book Search helps readers discover the world's books while helping authors and publishers reach new audiences. You can search through the full text of this book on the web at `http://books.google.com/`

B 427151


1837
ARTES
SCIENTIA
VERITAS
LIBRARY OF THE
UNIVERSITY OF MICHIGAN
SI QUAERIS PENINSULAM AMOENAM
CIRCUMSPICE

TS
1550
.N2

NEW ENGLAND

# Cotton Manufacturers' Association.

---

*Proposal for*

.....

*Membership of*

.....

## Notice to Members.

To make the Cotton Manufacturers' Association an absolutely representative body it must include as many as possible of those who are eligible for membership. It has been found that many who were eligible and desired to join had not done so because not invited. It is hoped that every member will present the matter to non-members among his associates. The accompanying blank proposition for membership can be detached from the cover at the row of perforations.

NEW ENGLAND

# Cotton Manufacturers' Association.

---

*Proposal for*

..... .....

*Membership of*

..... .....

*Application Received*

..... 190 .

*Action by Board of Government, ...favorable.*

..... 190 .

*Voted by the Association, .....elected,*

190 .

# New England Cotton Manufacturers' Association.

**Room 57, International Trust Building,**

**45 MILK STREET,**

BOSTON, MASS.

## PROPOSAL FOR MEMBERSHIP.

(When filled out, to be mailed to the Secretary, P. O. Box 3672, Boston, Mass., in time for action by the Board of Government, at least one week before a meeting of the Association.)

*Mr.* .....

*Position,* .....

*P. O. Address,* .....

*is proposed for* ..... *membership in the* NEW ENGLAND COTTON
active or associate

MANUFACTURERS' ASSOCIATION *by* .....
signature of member proposing candidate.

*a member of the Association.*

*Experience of Applicant,* (Please state, in full, particulars of detail, giving names, dates, and nature of work, as fully as convenient.)

.....

.....

.....

.....

.....

.....

.....

.....

The undersigned certifies that the above statements are correct, and agrees that, if elected to the Association, he will be governed by its rules as long as his connection with it shall continue.

*Date,* ..... 190 .

.....
signature of candidate.

Frederick E. Clarke

# TRANSACTIONS

OF THE

# New England

# COTTON MANUFACTURERS' ASSOCIATION.

Founded April 20, 1865. Incorporated Dec. 1, 1894.

**NO. 67.**

## SEMI-ANNUAL MEETING.

**Held at Windsor Hotel, Montreal, P. Q., Canada,**

OCTOBER 5-6, 1899.

**Office of the Association:**

**Room 57, International Trust Building, 45 Milk Street,**
**Corner of Devonshire St., Boston, Mass.**

WALTHAM, MASS.:
PRESS OF E. L. BARRY,
1899.

ENTERED ACCORDING TO ACT OF CONGRESS
IN THE YEAR 1899
BY THE NEW ENGLAND COTTON MANUFACTURERS' ASSOCIATION,
IN THE OFFICE OF THE LIBRARIAN OF CONGRESS
AT WASHINGTON.

By vote of the Board of Government, the price of the *Transactions* is $5.00 per copy to non-members. The price of this issue and the one previous is $1.00 each to members, and the prices of copies previous to Volume 61, is 50 cents to members but each member is entitled to a copy as a part of the privilege of membership.

# CHARTER.

No. 6091.

## Commonwealth of Massachusetts.

BE IT KNOWN, That whereas, EDWARD W. THOMAS, C. J. H. WOODBURY, WILLIAM J. KENT, F. M. MESSENGER, HARRY T. WHITIN, ARTHUR H. LOWE, ALBERT F. KNIGHT, ALFRED M. GOODALE, FRED C. MCDUFFIE and GEORGE W. BEAN have associated themselves with the intention of forming a corporation under the name of the NEW ENGLAND COTTON MANUFACTURERS' ASSOCIATION, for the purpose of encouraging scientific investigation and experiment as to the methods of manufacturing cotton; collecting and imparting information relating to this industry, promoting social intercourse among its members; and establishing and maintaining a library of works on textiles in the city of Boston, and have complied with the provisions of the Statutes of this Commonwealth in such case made and provided, as appears from the certificate of the President, Treasurer and Directors of said corporation, duly approved by the Commissioner of Corporations, and recorded in this office.

Now, Therefore, I, WILLIAM M. OLIN, Secretary of the Commonwealth of Massachusetts, do hereby certify that said EDWARD W. THOMAS, C. J. H. WOODBURY, WILLIAM J. KENT, F. M. MESSENGER, HARRY T. WHITIN, ARTHUR H. LOWE, ALBERT F. KNIGHT, ALFRED M. GOODALE, FRED C. MCDUFFIE and GEORGE W. BEAN, their associates and successors, are legally organized and established as and are hereby made an existing corporation under the name of the

NEW ENGLAND COTTON MANUFACTURERS' ASSOCIATION,

with the powers, rights and privileges, and subject to the limitations, duties and restrictions which by law appertain thereto.

*Seal of the Commonwealth of Massachusetts.*

Witness my official signature hereunto subscribed, and the seal of the Commonwealth of Massachusetts hereunto affixed this first day of December, in the year of our Lord one thousand eight hundred and ninety-four.

WILLIAM M. OLIN,

*Secretary of the Commonwealth.*

187007

# Commonwealth of Massachusetts.

(Acts of 1895, Chap. 163.)

AN ACT TO AUTHORIZE THE NEW ENGLAND COTTON MANUFACTURERS' ASSOCIATION TO HOLD ITS MEETINGS WITHOUT THE COMMONWEALTH.

*Be it enacted, etc., as follows:*

SECTION 1. The New England Cotton Manufacturers' Association is hereby authorized to hold its meetings in any state or territory of the United States and in the District of Columbia; provided, however, that its annual meeting shall be held in this Commonwealth at least once in five years.

SECT. 2. This act shall take effect upon its passage. [Approved March 23, 1895.]

NEW ENGLAND COTTON MANUFACTURERS' ASSOCIATION.

FOUNDED APRIL 20, 1865.

INCORPORATED DECEMBER 1, 1894.

# CONSTITUTION AND BY-LAWS.

## ACTIVE MEMBERS.

ARTICLE 1. Any person who is actively engaged as President, Treasurer, Agent, Superintendent or Manager in the manufacture, printing or finishing of cottons shall be eligible for active membership.

## ELECTION OF MEMBERS.

ARTICLE 2. All nominations for membership shall be made in writing, at least one week before the date of any regular meeting, and shall be considered by the Board of Government, and reported to the meeting, favorably or adversely, for the action of the Association. *Provided*, that in case the Board shall decide to report adversely upon any nomination, the member who shall have made it shall be informed of the intention so to report, in order that he may have an opportunity to withdraw the name. Upon such report active members may be admitted, if they obtain a majority of votes of the members present and voting therefor, by acceptance in writing, and paying an admission fee of ten dollars, and maintaining their membership by the payment of an annual assessment not exceeding ten dollars. Any member failing to pay two successive assessments shall cease to be a member at the end of six months from the date when such second assessment shall become due. Any member may withdraw from the Association upon payment of all arrearages, first giving notice of his intention so to do, in writing, to the Secretary, and the Board of Government may accept such resignation; and any member may be expelled for cause,

at any regular meeting, two-thirds of the members present voting therefor.

### ASSOCIATE MEMBERS.

ARTICLE 3. Persons engaged in the manufacture of cotton or cotton fabrics, or the manufacture of textile machinery, or industries kindred to the cotton manufacture, may become associate members of the Association. The methods of application, nomination, election and withdrawal from the Association being under the same conditions as those provided for active members in Article 2, excepting that this class of membership does not carry with it the privilege of voting or speaking, except by permission from the Board of Government or a vote of the Association to allow permission.

The initiation fee for associate members shall be twenty-five dollars, and the annual assessment shall be double the sum annually voted for active members.

Associate members may be expelled by a majority vote of the Board of Government.

### HONORARY MEMBERS.

ARTICLE 4. Honorary members may be elected, when recommended by the Board of Government, at any regular meeting of the Association, who shall be enrolled as such, and shall be entitled to attend the meetings of the Association and participate in its proceedings, without the right to vote. They shall not be subject to payment of admission fees or assessments. No person actively engaged in cotton manufacture shall be eligible to honorary membership.

ARTICLE 5. It shall be the duty of all members of the Association to make returns to the Secretary of such statistics as may be called for by him, under the direction of any committee duly appointed for the collection of statistics, when not incompatible with private interests.

### OFFICERS.

ARTICLE 6. The officers of this Association shall be a President, two Vice-Presidents, six Directors, a Treasurer, Secretary, and Auditor of Accounts.

ELECTION OF OFFICERS.

ARTICLE 7. At each annual meeting there shall be chosen by ballot a President, two Vice-Presidents and two Directors; the President and Vice-Presidents to serve one year, and the two Directors shall be chosen for terms of three years.

DUTIES OF OFFICERS.

ARTICLE 8. The President, or in his absence the senior Vice-President present, shall preside at all meetings of the Association and of the Board of Government. All officers shall hold their respective offices until their successors shall be chosen and accept their positions.

ARTICLE 9. The President, Vice-Presidents and Directors shall constitute a Board of Government, and have under their care and direction all matters pertaining to the management of the Association; and five of their number shall constitute a quorum for the transaction of business. Meetings of the board may be called by the President, at such time and place as he may deem expedient, giving each member a written or printed notice of the same at least five days before the day of meeting. At their first meeting the board shall elect a Treasurer, Secretary, and Auditor of Accounts for the year ensuing, and fix the amount of compensation of the Secretary. All vacancies in their board occasioned by death or resignation shall be filled by the board; and the persons so elected shall hold their offices until the next annual meeting. The board may, from time to time, as they shall deem expedient, appoint committees, from among their own board or from the members at large, to collect statistical information, examine new inventions or processes in manufacturing goods, as also to prepare essays on subjects of interest to the Association.

ARTICLE 10. The Treasurer shall keep a book in which all receipts and payments of money shall be entered, collect all moneys due the Association, and disburse the same upon the written order of the Board of Government. At the annual meeting in each year he shall make an exhibit of his accounts, or oftener if the Board of Government require it. He shall notify the members of assessments voted, and cause them to be collected in a reasonable time.

ARTICLE 11. The Secretary shall attend all meetings of the Association and of the Board of Government, and keep accurate records of

their doings. In the absence of the Secretary at any meeting, a Secretary *pro tem.* may be appointed by the presiding officer, who shall be sworn to do all things, while in office, required of the Secretary.

ARTICLE 12. The Auditor shall examine the accounts of the Treasurer annually, and report at each meeting the state of the finances.

### MEETINGS.

ARTICLE 13. The annual meeting of the members of the Association shall be held on the last Wednesday of April, or at such other time, and at such hour and place as the Board of Government may appoint. There shall also be a semi-annual meeting of the Association on the last Wednesday of October, in each and every year, or at such other time, and at such place and hour as the Board of Government may appoint.

Special meetings may be called by the Board of Government whenever they deem it expedient, or upon the written application of any ten members, made to the Secretary.

ARTICLE 14. All meetings of the members of the Association shall be in pursuance of a written or printed notice, addressed to each member, with the name of the President or Secretary attached thereto, and deposited in the Post Office ten days at least before the day of meeting, specifying the time and place of meeting; and at all such meetings fifteen members shall constitute a quorum for the transaction of business.

ARTICLE 15. Amendments to the By-Laws may be made at any stated meeting of the Association by a two-thirds vote; *provided*, notice of such proposed amendment be given in writing at a previous meeting, and also notice be given to each member by the Secretary, of the pendency of such amendment, ten days at least before any such meeting.

# BOARD OF GOVERNMENT.

## 1899.

**PRESIDENT.**

FREDERICK E. CLARKE, . . . LAWRENCE, MASS.

**VICE-PRESIDENTS.**

FRED C. McDUFFIE, . . . . BOSTON, MASS.
HENRY T. WHITIN, . . . . NORTHBRIDGE, MASS

**DIRECTORS.**

ALFRED E. ADAMS, . . . . WHITINSVILLE, MASS.
GEORGE H. HILLS, . . . . FALL RIVER, MASS.
JOHN TEMPEST MEATS, . . . TAUNTON, MASS.
CHAS. H. RICHARDSON, . . . CLINTON, MASS.
A. TENNY WHITE, . . . . . MANVILLE, R. I.
GEORGE F. WHITTEN, . . . MANCHESTER, N. H.

**AUDITOR.**

J. HERBERT SAWYER, . . . . BOSTON, MASS.

**SECRETARY.**

C. J. H. WOODBURY, P. O. Box 3672, BOSTON, MASS.

**OFFICE OF THE ASSOCIATION:**

ROOM 57, INTERNATIONAL TRUST BUILDING, 45 MILK STREET, CORNER OF DEVONSHIRE STREET, BOSTON, MASS.

# OFFICERS OF THE ASSOCIATION,

## FROM THE FIRST ORGANIZATION.

### PRESIDENTS.

| | | | |
|---|---|---|---|
| Ezekiel A. Straw, | 1865–78 | Robert McArthur, | 1892–94 |
| Amos D. Lockwood, | 1878–80 | Edw. W. Thomas, | 1894–95 |
| John Kilburn, | 1880–83 | A. M. Goodale, | 1895–96 |
| William C. Lovering, | 1883–85 | Arthur H. Lowe, | 1896–97 |
| Richard Garsed, | 1885–86 | Russell W. Eaton, | 1897–98 |
| J. S. Ludlam, | 1886–88 | Stephen A. Knight, | 1898–99 |
| Henry F. Lippitt, | 1888–89 | FRED'K E. CLARKE, | 1899– |
| Walter E. Parker, | 1889–92 | | |

### VICE-PRESIDENTS.

| | | | |
|---|---|---|---|
| Amos D. Lockwood, | 1865–77 | Walter E. Parker, | 1885–89 |
| William A. Burke, | 1865–73 | Richard B. Borden, | 1886–88 |
| John C. Palfrey, | 1873–76 | Arnold B. Sanford, | 1888–91 |
| Edward Atkinson, | 1876–78 | Robert McArthur, | 1889–92 |
| A. G. Cumnock, | 1877–80 | Simeon B. Chase, | 1891–93 |
| Charles Nourse, | 1878–81 | E. W. Thomas, | 1892–94 |
| William F. Goulding, | 1880–83 | A. M. Goodale, | 1893-95 |
| Richard Garsed, | 1881–85 | William J. Kent, | 1894–97 |
| J. S. Ludlam, | 1883–86 | FRED. C. McDUFFIE, | 1895– |
| | | HENRY T. WHITIN, | 1897– |

**DIRECTORS.**

| | | | |
|---|---|---|---|
| J. S. Davis, | 1865–69 | A. M. Wade, | 1868–69 |
| Charles Nourse, | 1865–78 | D. J. Johnston, | 1869–70 |
| Phineas Adams, | 1865–74 | A. G. Cumnock, | 1869–77 |
| William P. Haines, | 1865–69 | F. E. Clarke, | 1869–75 |
| Thomas J. Borden, | 1865–78 | S. S. Spencer, | 1887–90 |
| Daniel D. Crombie, | 1865–68 | E. W. Thomas, | 1888–92 |
| Cyrus I. Barker, | 1875–80 | William W. Whitin, | 1888–93 |
| Hervey Kent, | 1877–81 | Robert R. Smith, | 1889–92 |
| David J. Johnston, | 1878–82 | Alfred M. Goodale, | 1890–93 |
| Walter Paine, 3d, | 1878–80 | William J. Kent, | 1891–94 |
| Chas. L. Lovering, | 1878–83 | Herman F. Straw, | 1891–93 |
| Richard Garsed, | 1880–81 | Fred C. McDuffie, | 1892–95 |
| William H. Jennings, | 1880–83 | George W. Bean, | 1892–95 |
| Chas. D. McDuffie, | 1881–83 | F. M. Messenger, | 1893–95 |
| Walter E. Parker, | 1881–85 | Arthur H. Lowe, | 1894–96 |
| John W. Danielson, | 1881–85 | Henry T. Whitin, | 1894–97 |
| William E. Barrows, | 1882–83 | Herbert L. Pratt, | 1895–98 |
| Rufus A. Maxfield, | 1883–86 | Stephen A. Knight, | 1895–98 |
| George W. Weeks, | 1883–86 | Russell W. Eaton, | 1896–97 |
| Henry S. Howe, | 1883–87 | Albert F. Knight, | 1893–99 |
| Richard B. Borden, | 1883–86 | John Eccles, | 1895–99 |
| O. S. Brown, | 1885–91 | C. H. RICHARDSON, | 1897– |
| Henry F. Lippitt, | 1885–88 | GEORGE H. HILLS, | 1897– |
| Wilbur A. Stiles, | 1886–88 | JOHN T. MEATS, | 1898– |
| Stephen N. Bourne, | 1886–91 | GEO. F. WHITTEN, | 1898– |
| John Kilburn, | 1870–80 | A. TENNY WHITE, | 1899– |
| William P. Haines, | 1874–78 | ALFRED E. ADAMS, | 1899– |
| Robert McArthur, | 1886–89 | | |

**AUDITORS.**

| | | | |
|---|---|---|---|
| BENJAMIN SAUNDERS, | 1865–71 | HENRY D. SULLIVAN, | 1873–82 |
| JOHN C. PALFREY, | 1871–73 | J. HERBERT SAWYER, | 1882 |

**SECRETARY AND TREASURER.**

| | | | |
|---|---|---|---|
| AMBROSE EASTMAN, | 1865–94 | C. J. H. WOODBURY, | 1894 |

# MEMBERS OF THE ASSOCIATION.

## Oct. 5, 1899.

Members of the Association are respectfully requested to scrutinize the following list, and advise the Secretary, P. O. Box 3672, Boston, Mass., of change in address, or any error in regard to their names.

As a number of members rejoined the Association after severing their first membership, the date of their earliest election is given.

### HONORARY MEMBERS.

| | | | |
|---|---|---|---|
| GEORGE ARMS | Grand Hotel | New York City | Oct. 16, 1872. |
| JONES S. DAVIS | 6 Newton St., | Holyoke, Mass. | Oct. 27, 1897. |
| AMBROSE EASTMAN | 53 State St. | Boston, Mass. | Sept. 27, 1894. |
| SAMUEL WEBBER | Hydraulic Engineer | Charlestown, N. H. | Apr. 28, 1897. |

### ACTIVE MEMBERS.

| | | | |
|---|---|---|---|
| Alfred E. Adams | Agt. Whitinsville Cotton Mills, Agt. Linwood Mills | Whitinsville, Mass. | Apr. 27, 1887. |
| John S. Adams, Jr. | Supt. Adams Bros. Mfg. Co. 35 Grove St., | Adams, Mass. | Apr. 29, 1896. |
| Stephen L. Adams | Treas. Stafford Mfg. Co. | Central Falls, R. I. | Apr. 24, 1895. |
| Joseph D. Aiken | Ponemah Mills | Taftville, Conn. | Oct. 28, 1891. |
| F. S. Akin | Supt. Cornell Mills | Fall River, Mass. | Sept. 27, 1894. |
| Charles T. Aldrich | Treas. Aldrich Mfg. Co. | Box 34, Providence, R. I. | Apr. 28, 1886. |
| B. A. Alexander | Supt. Boston Duck Co. | Bondsville, Mass. | Apr. 28, 1898. |
| George E. Ames | Mech. Supt. Lawrence Mfg. Co. | Lowell, Mass. | Apr. 24, 1895. |
| William Ames | Treas. Fletcher Manufg. Co., Box 83, 47 Charles St., | Providence, R. I. | Apr. 30, 1879. |
| Charles B. Amory | Treas. Hamilton Manufg. Co. 70 Kilby St., | Boston, Mass. | Apr. 25, 1894. |

| | | | |
|---|---|---|---|
| Frederic Amory | Treas. Nashua Mfg. Co. / Treas. Jackson Mfg. Co. | 40 Water St., Boston, Mass. | Apr. 27, 1899. |
| Thomas Armstrong | Supt. No. Pownal Mfg. Co. | No. Pownal, Vt. | Oct. 27, 1897. |
| Abel T. Atherton | Machine Maker | Bay Side, R. I. | Oct. 16, 1872. |
| Edward Atkinson | Prest. Boston Mfrs. Mu. Fire Ins. Co. | 31 Milk St., Boston, Mass. | Apr. 19, 1871. |
| E. W. Atkinson | Stoddard, Haserick, Richards & Co. | 152 Congress St., Boston, Mass. | Oct. 27, 1886. |
| H. C. Atwood | Treas. Williamsville Manufg. Co. | Providence, R. I. | Apr. 29, 1885. |
| James A. Atwood | Agt. Wauregan Mills and Quinebaug Co. | Wauregan, Conn. | Oct. 28, 1891. |
| John Walter Atwood | Supt. Wauregan Mills | Wauregan, Conn. | Oct. 24, 1895. |
| W. E. Atwood | Secy. and Asst. Treas. Williamsville Manufg. Co. | Killingly, Conn. | Sept. 27, 1894. |
| George A. Ayer | Supt. City Mfg. Corp. / Supt. Bristol Mfg. Corp. | 123 Fifth St., New Bedford, Mass. | Apr. 24, 1895. |
| Charles L. Bailey | Gen. Supt. Boston Manufg. Co. | Box 143, Waltham, Mass. | Sept. 27, 1894. |
| Henry A. Bailey | Agt. Chicopee Manufg. Co. | Chicopee Falls, Mass. | Oct. 25, 1893. |
| Edwin H. Baker | Bliss, Fabyan & Co., Box 2899 | 117 Duane St., New York City, N. Y. | Apr. 24, 1878. |
| Philip S. Baker | Sec. and Treas. Crowders Mountain Cotton Mills | Kings Mt., N. C. | Oct. 24, 1895. |
| Edward R. Ballou | Supt. Brighton Mills | 540 West 23rd St., New York City | Apr. 25, 1894. |
| William P. Bancroft | Vice-Pres. Joseph Bancroft & Sons Co. | Wilmington, Del. | Oct. 31, 1883. |
| Louis B. Barker | Agt. United States Cotton Co. | Central Falls, R. I. | Apr. 27, 1899. |
| Lewis E. Barnes | Agt. Pemberton Co. & Methuen Co., | Methuen, Mass. | Oct. 24, 1895. |
| William A. Barrell | Agt. Lawrence Duck Co. | Lawrence, Mass. | Apr. 30, 1884. |
| Edwin N. Bartlett | Supt. Sigourney and Rockdale Mills, | North Oxford, Mass. | Apr. 29, 1891. |
| Daniel Moore Bates, Jr. | Asst. Supt. Joseph Bancroft & Sons Co., | Wilmington, Del. | Apr. 28, 1898. |
| Joseph P. Battles | Asst. Mgr. Amer. Moistening Co., Box 1460 | 67 Equitable Building, 150 Devonshire St., Boston, Mass. | Oct. 24, 1895. |
| Edward C. Beach | Agt. Mass. Mills in Georgia | Lindale, Georgia | Oct. 5, 1899. |
| George W. Bean | Agt. Androscoggin Mills | Lewiston, Me. | Apr. 17, 1872. |
| Robert Beatty | Robert Beatty & Co. | Coral and Adams Sts., Philadelphia, Pa. | Oct. 27, 1897. |
| Truman Beckwith | Treas. Dyerville Manufg. Co. | Box 171, Providence, R. I. | Apr. 27, 1892. |
| John W. Bell | Asst. Treas. and Mgr. Smith & Dove Manufg. Co. | Andover Mass. | Oct. 27, 1897. |
| A. C. Bent | Agt. Safety Seamless Pocket Co. | Taunton, Mass. | Oct. 27, 1897. |
| W. N. Blackstone | Treas. Attawaugan Co. / Treas. Totokett Mills Co. | Norwich, Conn. | Apr. 29, 1896. |
| William W. Blades | Gen. Supt. Lorraine Mfg. Co. | 135 Mineral Spring Ave., Pawtucket, R. I. | Oct. 25, 1893. |

| | | | |
|---|---|---|---|
| T. Ashby Blythe | Proprietor Ashby Cotton Mills | 114 Chestnut St., Philadelphia, Pa. | Oct. 27, 1897. |
| John P. Bodge | Treas. Arkwright Mills | Fall River, Mass. | Oct. 27, 1897. |
| Jefferson Borden, Jr. | Supt. Fall River Bleachery | Fall River, Mass. | Apr. 27, 1899. |
| Nathaniel B. Borden | Treas. Barnard Manufg. Co. | Fall River, Mass. | Oct. 15, 1873. |
| Richard B. Borden | Treas. Richard Borden Mfg. Co. / Treas. Troy C. & W. Mfg. Co. | Fall River, Mass. | July 18, 1866. |
| Thomas J. Borden | Pres. Richard Borden Manufg. Co. | Box 118, Fall River, Mass. | Apr. 20, 1865. |
| E. S. Boss | Agt. Willimantic Linen Co. | Willimantic, Conn. | Oct. 29, 1879. |
| Stephen N. Bourne | Agt. Stark Mills | Manchester, N. H. | Oct. 21, 1869. |
| Frank A. Bowen | Supt. Appleton Co. | Lowell, Mass. | Apr. 28, 1897. |
| Arthur F. Brackett | Supt. Royal Arctic & Valley Queen | Riverpoint, R. I. | Oct. 24, 1895. |
| A. W. Brainerd | Gen. Supt. B. B. R. Knight's Mills | P. O. Box 174, 3 Washington Row, Providence, R. I. | Apr. 28, 1898. |
| Ernest Bridge | Supt. Jas. Chadwick & Bro. Ltd. | Jersey City, N. J. | Apr. 24, 1895. |
| Christopher P. Brooks | Managing Director New Bedford Textile School | New Bedford, Mass. | Apr. 28, 1897. |
| Henry R. Brown | Supt. Hope Co. and Phenix Mill | Phenix, R. I. | Apr. 28, 1897. |
| Isaac A. Brown | Treas. Narragansett Mills | Box 324, Fall River, Mass. | Sept. 29, 1898. |
| James W. Brown | P. O. Box 312, | Ipswich, Mass. | Oct. 24, 1895. |
| O. S. Brown | Agt. Salmon Falls Manufg. Co. | Salmon Falls, N. H. | Apr. 21, 1875. |
| Thomas J. Brown | George Brown's Sons | Mt. Joy, Penn. | Oct. 27, 1897. |
| E. C. Bucklin | Treas. Interlaken Mills, / Treas. Harris Mfg. Co. | Box 289, Providence, R. I. | Apr. 25, 1883. |
| Robert Burgess | Agt. Grinnell Mfg. Corp. | 745 County St., New Bedford, Mass. | Apr. 27, 1892. |
| Edward N. Burke | Lowell Machine Shop | Lowell, Mass. | Apr. 28, 1880. |
| Hervey Burnham | Supt. Beaver Mills and Eclipse Mill | North Adams, Mass. | Apr. 27, 1899. |
| W. R. Burnham | | Norwich, Conn. | Apr. 29, 1885. |
| William D. Cadwell | Agt. Nashua Mfg. Co. & Jackson Co., | Nashua, N. H. | Apr. 19, 1871. |
| John P. Campbell | Supt. New York Mills, | New York Mills, Oneida Co., N. Y., | Sept. 22, 1896. |
| Byron F. Card | Agt. Howland Mills | New Bedford, Mass. | Apr. 25, 1888. |
| George A. Chace | Treas. Bourne Mills | Fall River, Mass. | Apr. 25, 1877. |
| James C. Chalmers | Vice-Pres. Renfrew Mfg. Co. | Adams, Mass. | Oct. 5, 1899. |
| Simeon B. Chase | Treas. King Philip Mills | Fall River, Mass. | Apr. 21, 1875. |
| Clarence N. Childs | Asst. Supt. Hamilton Manufg. Co. | 43 Pine St., Lowell, Mass. | Apr. 24, 1895. |
| Elmer G. Childs | Agt. Boston Duck Co. | Bondsville, Mass. | Oct. 26, 1892. |
| Jno. H. C. Church | Asst. Treas and Sec. Monument Mills, | Gt. Barrington, Mass. | Apr. 28, 1897. |
| Ernest E. Clark | Asst. Supt. H. N. Slater Mills | Webster, Mass. | Apr. 29, 1896. |
| George A. Clark | Supt. Manchester Mills | Manchester, N. H. | Oct. 25, 1882. |
| Alfred Clarke | Mechanical Engineer, 23 Central St., | Boston, Mass. | Apr. 30, 1879. |
| Frederick E. Clarke | Pres. Boston & Lowell R. R. Co. | Lawrence, Mass. | Apr. 20, 1865. |
| E. N. Clemence | Treas. Eagle & Phenix Mills and / Agt. for Receivers | Columbus, Ga. | Apr. 28, 1897. |

| | | | |
|---|---|---|---|
| W. H. Cloher, Jr. | Treas. Utica Cotton Co. | Capron, Oneida Co., N. Y. | Sept. 22, 1896. |
| Alonzo A. Coburn | Treas. Atherton Machine Co. | Lowell, Mass. | Apr. 25, 1888. |
| Josiah G. Coburn | | Newton, Mass. | Apr. 20, 1865. |
| John A. Collins | Supt. American Linen Co. | 73 Cottage St., Fall River, Mass. | Oct. 31, 1883. |
| Frank B. Comins | Treas. American Moistening Co. | 150 Devonshire St., Room 67, Boston, Mass. | Oct. 28, 1891. |
| John J. Connell | Supt. Cohannet Mills | Taunton, Mass. | Apr. 27, 1892. |
| Frank H. Cotton | Supt. Hope Mills Mfg. Co. | Hope Mills, N. C. | Apr. 27, 1899. |
| Alphonse S. Covel | Treas. Tremont and Suffolk Mills, | P. O. Box 1716, 70 Kilby St., Boston, Mass. | Oct. 31, 1877. |
| William W. Crapo | Pres. Wamsutta Mills | New Bedford, Mass. | Sept. 29, 1898. |
| P. T. Creed | Agt. Hopewell Mills | Box 356, Taunton, Mass. | Sept. 22, 1896. |
| John B. Cudlip | Supt. Gibson Cotton Mills | Marysville, N. Bruns. | Apr. 28, 1897. |
| H. H. Culver | Supt. Elizabeth Poole Mills | Taunton, Mass. | Apr. 28, 1897. |
| Henry S. Culver | Supt. Westville Cotton Mill | Taunton, Mass. | Apr. 28, 1897. |
| A. G. Cumnock | Treas. Appleton Co. | Lowell, Mass. | Oct. 28, 1885. |
| Andrew J. Currier | Mgr. Albion and Valley Falls Co. | Valley Falls, R. I. | Apr. 25, 1888. |
| T. B. Dallas | Treas. Phœnix Cotton Mills<br>Treas. Dallas Manufg. Co. | Box 8386, Nashville, Tenn. | Oct. 24, 1895. |
| Philip Dana | Supt. Dana Warp Mills | Westbrook, Me. | Sept. 29, 1898. |
| Woodbury K. Dana | Treas. Dana Warp Mills | Westbrook, Me. | Apr. 25, 1888. |
| Albert W. Danforth | Supt. & Engineer Shanghai Cot. Cloth Mills, Shanghai, China | 881 Bridge St., Lowell, Mass. | Apr. 27, 1881. |
| A. Lockwood Danielson | Asst. Treas. Quinebaug Co., | Box 900, Providence, R. I. | Sept. 27, 1894. |
| J. DeForest Danielson | Asst. Treas. Lockwood Co. & Lewiston Bleachery & Dye Works | Providence, R. I. | Sept. 27, 1894. |
| John W. Danielson | Treas. Lockwood Co. | Box 900, Providence, R. I. | Jan. 15, 1868. |
| B. D. Davol | Pres. Barnard Mfg. Co. | P. O. Box 418, Fall River, Mass. | Apr. 25, 1877. |
| James C. Deane | Supt. Griswoldville Manufg. Co. | Griswoldville, Mass. | Apr. 25, 1894. |
| George DeForest | Treas. Utica Steam Cotton Mills | Utica, New York | Oct. 27, 1897. |
| William P. Dempsey | Agt. Dempsey Bleachery and Dye Works, | Pawtucket, R. I. | Apr. 28, 1886. |
| Charles W. Dennett | Agt. Johnson Manufg. Co.<br>Agt. Dunbar Mills Co. | North Adams, Mass. | Oct. 29, 1890. |
| Edward P. Dennis | Lowell Machine Shop | Lowell, Mass. | Apr. 25, 1888. |
| Charles A. Denny | Pres. American Card Clothing Co. | Leicester, Mass. | Apr. 25, 1888. |
| P. Y. DeNormandie | Pepperell and Laconia Cos. | 30 Kilby St., Boston, Mass. | Apr. 29, 1896. |
| Charles Owen Dexter | Mgr. Canadian Col'd Cotton Mills Co. Ltd. | Hamilton, Ont., Can. | Apr. 24, 1895. |
| Lewis Dexter, Jr. | Mgr. The Canadian Colored Cotton Mills Co., Ltd. | Milltown, N. B. | Apr. 27, 1899. |
| Samuel Dibble | Pres. Enterprise Cotton Mills, | Orangeburg, S. C. | Sept. 29, 1898. |
| John W. Dickinson | Supt. Lyman Mills | Holyoke, Mass. | Oct. 27, 1897. |
| F. Dilling | Sec'y & Treas. Dilling Cotton Mills | Kings Mountain, N. C. | Oct. 24, 1895. |

| | | | |
|---|---|---|---|
| Albert W. Dimick | Agt. Indian Head Mills of Alabama, | Cordova, Ala. | Apr. 25, 1894. |
| Bradford C. Divine | Supt. and Mgr. Utica Willow Vale Bleaching Co. | Chadwicks, N. Y. | Apr. 27, 1899. |
| Eben S. Draper | Agt. Draper Co. | Hopedale, Mass. | Oct. 31, 1888. |
| George A. Draper | Treas. Draper Co. | Hopedale, Mass. | Oct. 31, 1888. |
| George Otis Draper | Sec'y Draper Co. | Hopedale, Mass. | Apr. 24, 1895. |
| William F. Draper | Pres. Draper Co. | Hopedale, Mass. | July 17, 1867. |
| William F. Draper, Jr. | Draper Co. | Hopedale, Mass. | Oct. 29, 1890. |
| John Drowne | Supt. Cocheco Mfg. Co. | Dover, N. H. | Apr. 29, 1896. |
| Joseph M. Dunham | 43 Edwards St., | Springfield, Mass. | Oct. 26, 1892. |
| Frank H. Dwelly | Treas. Tecumseh Mills | Fall River, Mass. | Apr. 27, 1899. |
| David H. Dyer | D. H. Dyer & Son, Mill Engineers, 7 and 8 Pocassett Bank Building, | Fall River, Mass. | Oct. 18, 1871. |
| William A. Eastman | Treas. Lowell Hosiery Co. | Lowell, Mass. | Apr. 24, 1878. |
| Russell W. Eaton | Agt. Cabot Manufg. Co. | Brunswick, Me. | Oct. 26, 1887. |
| John Eccles | Supt. Ponemah Mills | Taftville, Conn. | Apr. 27, 1892. |
| Lawrence V. Elder | Contractor, 212 Tremont St., | Galveston, Texas | Oct. 27, 1886. |
| Oscar Elsas | Vice-Pres. Fulton Bag & Cotton Mills, P. O. Box 773, | Atlanta, Ga. | Apr. 28, 1897. |
| Frederick W. Ely | Agt. Columbian Manufg. Co. | Greenville, N. H. | Apr. 25, 1888. |
| H. B. Estes | Agt. Continental Mills | Lewiston, Me. | Apr. 26, 1893. |
| William Evans | Supt. Richard Borden Mfg. Co. | Fall River, Mass. | Apr. 29, 1896. |
| C. E. Falls | Sec. and Treas. Enterprise Mills | Kings Mountain, N. C. | Oct. 24, 1895. |
| Herbert R. Farnum | Supt. Bernon Mills | Georgiaville, R. I. | Apr. 27, 1881. |
| Charles F. Farrar | Supt. Wm. A. Slater Mills Corp. | Slatersville, R. I. | Oct. 27, 1897. |
| James T. Ferguson | Supt. Boott Mills | Lowell, Mass. | Oct. 5, 1899. |
| Frank S. Field | Supt. & Agt. Massaemit Yarn Mills | Shattuckville, Mass. | Oct. 24, 1895. |
| William Firth | Pres. American Moistening Co., 150 Devonshire St., Room 67, | Boston, Mass. | Apr. 25, 1888. |
| Charles H. Fish | Agt. Cocheco Manufg. Co. | Dover, N. H. | Apr. 27, 1887. |
| Henry E. Fisher | Vice-Pres. & Agt. Atlanta Cotton Mills | Atlanta, Ga. | Oct. 24, 1895. |
| Herbert Fisher | | Taunton, Mass. | Oct. 29, 1879. |
| William B. Fittz | Supt. West Boylston Manufg. Co. | Oakdale, Mass. | Oct. 26, 1892. |
| Frederick A. Flather | Mech. Engineer & Foreman Lowell Machine Shop | Lowell, Mass. | Apr. 29, 1891. |
| M. F. Foster | | Milford, N. H. | Apr. 17, 1872. |
| Philip H. Fowler | | Gloucester City, N. J. | Nov. 30, 1881. |
| Edward W. France | Dir. of Philadelphia Textile School, N. W. Cor. Broad and Pine Sts., | Philadelphia, Pa. | Sept. 22, 1896. |
| Arthur C. Freeman | Supt. Finishing Dept., Boston Mfg. Co., 97 Church St., | Waltham, Mass. | Apr. 27, 1899. |
| C. H. Frisbie | Agt. Attawaugan Co. | Norwich, Conn. | Oct. 29, 1890. |

| | | | |
|---|---|---|---|
| W. T. Galey | Pres. Aberfoyle Manufg. Co. | Chester, Pa. | Apr. 28, 1897. |
| William Gammell | Agt. Berkeley Co. | Providence, R. I. | Oct. 28, 1885. |
| James G. Garland | 10 Adams St. | Biddeford, Me. | Oct. 29, 1879. |
| Edward T. Garsed | Treas. Hucomuga Mills | Greensboro, N. C. | Apr. 28, 1898. |
| Joshua Garsed | Wingohocking Mills and National Spinning Co., Frankford | Philadelphia, Pa. | Oct. 27, 1897. |
| James A. Gary | Alberton Mills . 108 W. German St. | Baltimore, Md. | Apr. 25, 1883. |
| James Gee | Supt. Interlaken Dye Works | Fiskville, R. I. | Apr. 28, 1898. |
| Charles E. Getchell | Supt. Waltham Bleachery and Dye Works P. O. Box 62, 35 Willow St. | Waltham, Mass. | Oct. 30, 1889. |
| Daniel Gilligan | Supt. Pocasset and Metacomet Mills, | Fall River, Mass. | Apr. 29, 1896. |
| William C. Godfrey | Agt. Indian Orchard Co. | Indian Orchard, Mass. | Oct. 29, 1890. |
| Alfred M. Goodale | Treas. Boston Manufg. Co. 50 State St. | Boston, Mass. | Apr. 25, 1883. |
| Louis B. Goodall | Treas. Goodall Worsted Co. | Sanford, Me. | Oct. 5, 1899. |
| Charles H. Gorton | Agt. Glenark Knitting Co. | Woonsocket, R. I. | Apr. 25, 1894. |
| Marcellus Gould | Agt. Falls Company 85 Sachem St., | Norwich, Conn. | Sept. 22, 1896. |
| William B. Gowdey | Mfr. of Reeds, 40 Clifford St. Box 707, | Providence, R. I. | Apr. 30, 1890. |
| George P. Grant, Jr. | Treas. Grant Yarn Co. | Fitchburg, Mass. | Sept. 27, 1894. |
| D. W. Gray | Supt. Skenandoa Cotton Co. | Utica, N. Y. | Oct. 26, 1892. |
| R. A. Gray | Supt. Rodman Manufg. Co. | Allenton, R. I. | Apr. 24, 1895. |
| Stephen Greene | Mill Architect and Engineer 131 Devonshire St. | Boston, Mass. | Oct. 27, 1886. |
| William C. Greene | Treas. Peace Dale Manufg. Co. | Peace Dale, R. I. | Oct. 27, 1886. |
| Joseph Warren Greene | Supt. Hamilton Web Co. | Hamilton, R. I. | Apr. 29, 1896. |
| S. Greenwood | Mgr. Canadian Col'd Cot. Mills Co. | Cornwall, P. Q. | Oct. 5, 1899. |
| John Gregson | Agt. Fiskdale Mills | Fiskdale, Mass. | Apr 24, 1895. |
| Maxwell Grierson | Gn. Mgr. Jas. Chadwick & Bro., Ltd., | Jersey City, N. J. | Apr. 28, 1898. |
| Frederick Grinnell | Pres. Gen. Fire Extinguisher Co. | New Bedford, Mass. | Apr. 24, 1878. |
| David Grove | Supt. Dyerville Manufg. Co. 610 Manton Ave., | Providence, R. I. | Apr. 28, 1898. |
| H. S. Grove | Pres. Argo Mills Co., 218 Race St., | Philadelphia, Pa. | Apr. 28, 1898. |
| Arthur H. Gulliver | Asst. Supt. Lonsdale Co. | Ashton, R. I. | Apr. 24, 1889. |
| B. F. Guy | Gen. Supt. Pelzer Manufg. Co. | Pelzer, S. C. | Apr. 24, 1895. |
| William J. Hadfield | 225 Bailey St., | Lawrence, Mass. | Apr. 27, 1899. |
| Effingham C. Haight | Treas. Wampanoag Mills | Fall River, Mass. | Apr. 27, 1899. |
| Frank J. Hale | Agt. Saco and Pettee Machine Shops | Newton Upper Falls, Mass. | Apr. 27, 1892. |
| Samuel Hale | Vice-Pres. and Gen. Manager Dixie Cotton Mills | La Grange, Ga. | Apr. 29, 1891. |
| William E. Hall | Treas. Shaw Stocking Co. | Lowell, Mass. | Apr. 27, 1892. |
| Z. D. Hall | Supt. Berkshire Cotton Mfg. Co. 70 Orchard St., P. O. Box 963, | Adams, Mass. | Oct. 29, 1879. |
| John H. Hambly | Treas. Quidnick Manufg. Co. 49 Westminster St., | Providence, R. I. | Apr. 24, 1895. |

A. M. Hamilton . . . Supt. Parker Mills . . . . . Fall River, Mass. . . Apr. 28, 1897.
John F. Hamlet . . . P. O. Box 160 . . . . . Fall River, Mass. . . Oct. 31, 1888.
Joseph O. Hannum . . Agt. Saratoga Victory Manufg. Co. . . . . Victory Mills, Saratoga Co., N. Y. . Apr. 30, 1890.
Henry F. Harris . . . Treas. West Boylston Manufg. Co. . . . . Room 509, State Mutual Building, Worcester, Mass. . . Apr. 30, 1890.
John J. Hart . . . . . Charlton Manufg. Co. . . . . Pawtucket, R. I. . . Apr. 24, 1895.
William D. Hartshorne Agt. Arlington Mills . . . . . Lawrence, Mass. . . Apr. 27, 1899.
Samuel E. Hathaway . Supt. Fall River Iron Works Co. . . Fall River, Mass. . . Sept. 27, 1894.
William Hathaway . . Supt. Barnard Manufg. Co. . . . . Fall River, Mass. . . Apr. 25, 1894.
William B. Hawes . . Treas. No. Dighton Cotton Co. . . . . P. O. Box 733, Fall River, Mass. . . Oct. 24, 1895.
Alfred Hawkesworth . Supt. Merchants' Cotton Co. . . . . Montreal, P. Q. . . . Apr. 26, 1893.
Fred Hawkesworth . . Asst. Supt. Merchants' Cotton Co. . Montreal, P. Q. . . . Sept. 22, 1896.
William Hayes . . . . Agt. Barker Mill . . . . . Auburn, Me. . . . . Apr. 30, 1879.
W. G. Henderson . . . Agt. Shetucket Co. . . . . Norwich, Conn. . . . Apr. 29, 1896.
James G. Hill . . . . Cotton Manufr., Merrimack House . Lowell, Mass. . . . Jan. 15, 1868.
William R. Hill . . . Treas. Glasgow Manufg. Co. . . . . South Hadley Falls, Mass. Oct. 25, 1893.
George H. Hills . . . Treas. Davol Mills & Stevens Mfg. Co. . Fall River. Mass. . Oct. 24, 1895.
Charles H. Hobbs . . Agt. Thorndike Co. . . . . Thorndike, Mass. . . Apr. 28, 1886.
Franklin W. Hobbs . . Asst. Treas. Arlington Mills . . . . . P. O. Box 3590, 78 Chauncy St., Boston, Mass. . . . Apr. 27, 1899.
Louis L. Hohn . . . . . 122 High St., Westerly, R. I. . . . Apr. 28, 1897.
John Holland . . . . 12 Trackey St. . . . P. O. Box 96, Dover, N. H. . . . . Oct. 31, 1877.
Charles M. Holmes . . Supt. Manchaug Co. . . . . Manchaug, Mass. . . Apr. 27, 1899.
Gideon F. Holmes . . Treas. and Gen. Mgr. Plymouth Cor- . . . . . dage Co. . . . . No. Plymouth, Mass. . Oct. 30, 1889.
George W. Holt . . . Agt. Monohansett Manufg. Co. . . Putnam, Conn. . . . Oct. 29, 1879.
William P. Holt . . . Agt. William A. Slater Mills Corp. . . . . Box 315, Slatersville, R. I. . . Oct. 25, 1893.
George L. Hooper . . . . . 7 Belmont St., Lowell, Mass. . . . . Apr. 27, 1892.
Jno. Hopkinson . . . Gen. Mgr. Slayden & Kirksey Woolen Mills . . . . . Waco, Texas . . . . Apr. 25, 1883.
Thomas Horsfield . . . . . 95 Bonney St., New Bedford, Mass. . Oct. 27, 1897.
Henry S. Houghton, Jr. Supt. Paul Whitin Manufg. Co. . . Northbridge, Mass. . Apr. 24, 1895.
W. C. Houston . . . . Pres. Hope Mills Manufg. Co. . . . . 333 Drexel Building, Philadelphia, Pa. . . Apr. 28, 1897.
Elisha H. Howard . . Treas. Harris Textile Co. . . . . 309 Butler Exchange, Providence, R. I. . . Apr. 25, 1883.
Henry S. Howe . . . . Dry Goods Commission, 68 Chauncy St., Boston, Mass. . Oct. 31, 1877.
Albert C. Hoy . . . . Asst. Supt. Hamlet Mills . . . . . Woonsocket, R. I. . . Apr. 28, 1898.
W. S. Hume . . . . . Supt. Dominion Cotton Mills, Ltd. . . . . 176 Notre Dame St., Hochelaga, P. Q., Can. Oct. 29, 1890.
A. W. Hunking . . . . Agt. Merrimack Mfg. Co. . . . . Huntsville, Ala. . . Apr. 24, 1895.

D. Edwin Irving . . . Treas. The Irving & Leiper Mfg. Co., Chester, Pa. . . . . Oct. 27, 1897.

| | | | |
|---|---|---|---|
| J. E. Jenckes | Treas. E. Jenckes Manufg. Co. | Pawtucket, R. I. | Apr. 24, 1895. |
| Edward B. Jennings | Agt. N. E. Cotton Yarn Co. (Globe Dept.) | Fall River, Mass. | Sept. 29, 1898. |
| David L. Jewell | Agt. China, Webster & Pembroke Mills | Suncook, N. H. | Apr. 20, 1865. |
| David S. Johnston | Treas. Cohoes Iron Foundry & Mach. Co., | Cohoes, N. Y. | Oct. 28, 1891. |
| W. T. Jordan | Mgr. Mountain Island Mfg. Co. | Mountain Island, N. C. | Oct. 24, 1895. |
| Frank E. Kaley | Treas. Morse & Kaley Mfg. Co. | Milford, N. H. | Oct. 24, 1895. |
| W. E. Keach | Supt. Grant Yarn Co. | 123 Myrtle Ave., Fitchburg, Mass. | Oct. 26, 1892. |
| Roland R. Kelly | Supt. Williamstown Manufg. Co. | Williamstown Sta., Mass. | Nov. 30, 1881. |
| Joseph H. Kendrick | Gen. Agt. American Supply Co. | Box 850, Providence, R. I. | Apr. 30, 1879. |
| George E. Kent | Treas. Exeter Manufg. Co. | Pittsfield, N. H. | Oct. 31, 1888. |
| Hervey Kent | Pres. Exeter Manufg. Co. | Exeter, N. H. | Apr. 20, 1865. |
| Nathaniel B. Kerr | Agt. Boott Cotton Mills | Lowell, Mass. | Oct. 26, 1892. |
| John Kilburn | | Belmont, Mass. | Apr. 20, 1865. |
| Harry W. Kimball | Supt. Dominion Cotton Mills Co. | Magog, Province Quebec, Can. | Oct. 24, 1895. |
| Benjamin B. Kirk | Supt. Shove Mills | P. O. Box 140, 2107 South Main St., Fall River, Mass. | Apr. 28, 1897. |
| Albert Knight | Supt. Quidnick Mills | Quidnick, R. I. | Apr. 24, 1895. |
| Albert F. Knight | | Auburn, R. I. | Oct. 27, 1886. |
| C. Prescott Knight | Pres. River Point Corp. | River Point, R. I. | Sept. 29, 1898. |
| Jesse A. Knight | Sec'y & Supt. Lawton Spinning Co. | Providence, R. I. | Oct. 26, 1892. |
| Stephen A. Knight | Pres. Hebron Manufg. Co. | Box 820, Providence, R. I. | Oct. 21, 1868. |
| Walter B. Knight | Reynolds Manufg. Co. | Davisville, R. I. | Apr. 24, 1889. |
| Webster Knight | Pres. Natick Mills | Natick, R. I. | Sept. 29, 1898. |
| Fred Lacey | Supt. Montreal Cotton Co. | Valleyfield, P. Q. | Apr. 24, 1895. |
| William T. Lang | Agt. Brookside Mills | Knoxville, Tenn. | Apr. 28, 1897. |
| Walter H. Langshaw | Agt. Dartmouth Manufg. Corp. | New Bedford, Mass. | Apr. 29, 1896. |
| Elliott Cowdin Lambert | Supt. Amoskeag Manufg. Co. | Manchester, N. H. | Oct. 24, 1895. |
| George H. Law | Supt. Merchants' Mfg. Co. | 815 Walnut St., Fall River, Mass. | Apr. 28, 1897. |
| Abbott F. Lawrence | Treas. Winthrop Cotton Yarn Co | Box 848, Taunton, Mass. | Apr. 24, 1895. |
| Harold Lawton | Gen. Mgr. Warwick Mills | Centreville, R. I. | Oct. 27, 1886. |
| Evan Arthur Leigh | Textile Machinery | 70 Kilby St., Boston, Mass. | Oct. 29, 1890. |
| John Leiper | Supt. Fitchburg Worsted Mills | 171 Blossom St., Fitchburg, Mass. | Oct. 27, 1897. |
| J. Colby Lewis | Supt. W. A. Slater Mills Corp. | Jewett City, Ct. | Oct. 26, 1892. |
| Leontine Lincoln | Pres. Seaconnet Mills | Fall River, Mass. | Apr. 28, 1897. |
| B. F. G. Linnell | Greene & Daniels Mfg. Co. | P. O. Box 645, Central Falls, R. I. | Oct. 27, 1897. |

| | | | |
|---|---|---|---|
| Charles Warren Lippitt, | Treas. Silver Spring B. & D. Co. | Providence, R. I. | Oct. 30, 1878. |
| Henry F. Lippitt | Agt. Social and Manville Cos. | Providence, R. I. | Apr. 27, 1881. |
| William H. Loftus | Supt. Clark Thread Co. | Newark, N. J. | Oct. 27, 1897. |
| Robert W. Lord | Agt. R. W. Lord & Co. | Kennebunk, Me. | Oct. 20, 1869. |
| Ernest Lovering | Agt. Lyman Mills | Holyoke, Mass. | Apr. 25, 1888. |
| Henry M. Lovering | Agt. Whittenton Manufg. Co. | Taunton, Mass. | Oct. 27, 1880. |
| William C. Lovering | Pres. Whittenton Mfg. Co., | 40 Water St., Boston, Mass. | Oct. 25, 1876. |
| William M. Lovering | Supt. Whittenton Manufg. Co. | Taunton, Mass. | Sept. 27, 1894. |
| Arthur H. Lowe | Treas. Parkhill Manufg. Co. | Fitchburg, Mass. | Oct. 30, 1889. |
| David Lowe | Asst. Supt. Parkhill Manufg. Co. | Fitchburg, Mass. | Apr. 24, 1895. |
| Dudley T. Lyall | Asst. Mgr. Brighton Mills | 541 W. 23d St., N. Y. | Sept. 22, 1896. |
| William L. Lyall | Supt. J. & W. Lyall Loom and Machine Works | 540 W. 23d St., New York City | Oct. 26, 1892. |
| Herbert Lyman | Treas. Hadley Co. | 112 Beach St., Boston, Mass. | Oct. 24, 1895. |
| Otis G. Lynch | Supt. Enterprise Manufg. Co. | Augusta, Ga. | Oct. 24, 1895. |
| Alvin S. Lyon | Supt. Lowell Manufg. Co. | Lowell, Mass. | Apr. 26, 1882. |
| James R. MacColl | Treas. Lorraine Manufg. Co. | Pawtucket, R. I. | Apr. 24, 1895. |
| Charles L. Macomber | Pres. Winthrop Cotton Yarn Co. | Taunton, Mass. | Apr. 24, 1895. |
| Charles T. Main | Mech. and Mill Engineer | 1112 Exchange Bldg., Boston, Mass. | Oct. 28, 1885. |
| Charles R. Makepeace | Mill Engineer | Box 973, Providence, R. I. | Apr. 30, 1890. |
| A. T. Malcolmson | | 92 Hunter St., Hamilton, Province Ontario, Can. | Oct. 27, 1897. |
| Arthur B. Mann | J. H. Martin & Co., | Box 465, 99 Franklin St., New York | Apr. 25, 1894. |
| Charles H. Manning | Supt. Amoskeag Manufg. Co. | Manchester, N. H. | Oct. 28, 1885. |
| Henry F. Mansfield | Gen. Supt. Utica Steam Cotton Mills and Mohawk Valley Cotton Mills | Utica, N. Y. | Apr. 30, 1890. |
| Paul J. Marrs | Treas. Henderson Cotton Mills | Henderson, Ky. | Oct. 27, 1897. |
| Albert G. Martin | Supt. Kincaid Manufg. Co. | Box 182, Griffin, Spalding County, Ga. | Apr. 30, 1884. |
| Henry D. Martin | | Amesbury, Mass. | Apr. 28, 1897. |
| Ira J. Martin | | 62 Conant St., Pawtucket, R. I. | Oct. 26, 1892. |
| John R. Mason | Supt. Laurel Lake Mills | 439 Middle St., Fall River, Mass. | Apr. 28, 1897. |
| Philip A. Mathewson | Supt. King Philip Mills | Box 607, Fall River, Mass. | Apr. 24, 1895. |
| Thomas Mayor | Textile Machinery | Thomas Mayor & Son, 26 Olney St., Providence, R. I. | Oct. 27, 1880. |
| Robert McArthur | Agt. Pepperell Mfg. Co. | Biddeford, Me. | Apr. 17, 1872. |
| Thos. McAuliffe | Supt. Stevens Mfg. Co. | Fall River, Mass. | Apr. 28, 1898. |
| Charles D. McDuffie | Agt. Manchester Mills | Manchester, N. H. | Apr. 21, 1869. |
| Fred C. McDuffie | Treas. Everett Mills and York Manufg. Co. | P. O. Box 2934, 40 Water St., Boston, Mass. | Oct. 25, 1882. |
| William G. McLoon | Supt. Lancaster Mills, | Clinton, Mass. | Apr. 27, 1892. |
| William P. McMullan | Agt. Naumkeag Steam Cotton Co. | Salem, Mass. | Sept. 27, 1894. |
| John Tempest Meats | Gen. Supt. Mason Machine Works | Taunton, Mass. | Apr. 27, 1887. |
| Charles H. Merriman, Jr. | Supt. Globe Mill | Woonsocket, R. I. | Apr. 24, 1895. |

| | | | |
|---|---|---|---|
| Frank M. Messenger | Agt. Grosvenor Dale Co. | No. Grosvenor Dale, Conn. | Apr. 27, 1887. |
| W. H. Miles | Agt. Farwell Mills | Lisbon, Me. | Sept. 22, 1896. |
| R. M. Miller, Jr. | Vice-Pres. and Sec. The Atherton Mills | Charlotte, N. C. | Sept. 29, 1898. |
| James I. Milliken | Agt. Everett Mills | Lawrence, Mass. | Oct. 26, 1892. |
| Roscoe S. Milliken | Supt. Nashua Mfg. Co. | Nashua, N. H. | Apr. 29, 1896. |
| David Milne | C. J. Milne & Sons | Washington Ave. & 11th St., Philadelphia, Pa. | Apr. 28, 1897. |
| A. B. Mole | Mgr. Greylock Mill | Adams, Mass. | Apr. 24, 1895. |
| Edward A. Mongeon | Supt. Blackstone Manufg. Co. | Blackstone, Mass. | Apr. 24, 1895. |
| J. R. Montgomery | Pres. The J. R. Montgomery Co. | Windsor Locks, Conn. | Sept. 29, 1898. |
| George A. Moody | Supt. Warren Cotton Mills | West Warren, Mass. | Apr. 27, 1899. |
| Fred W. Moore | Agt. Cordis Mills | Millbury, Mass. | Apr. 27, 1892. |
| Albert H. Morton | Supt. Kitson Machine Co. | Lowell, Mass. | Oct. 28, 1891. |
| Oliver H. Moulton | Supt. Hamilton Manufg. Co. | Lowell, Mass. | Apr. 20, 1865. |
| Farquharson J. Muir | Supt. Canadian Col'd Cot. Mills Co., Ltd., St. Croix Mill | Milltown, N. B., Can. | Apr. 27, 1892. |
| Roscius C. Newell | Supt. Palmer Mill | Three Rivers, Mass. | Oct. 24, 1895. |
| William G. Nichols | Sec. and Treas. Springsteine Mills | Chester, S. C. | Oct. 25, 1893. |
| William M. Nixon | Pres. Atlanta Woolen Mills | Atlanta, Ga. | Oct. 5, 1899. |
| Franklin Nourse | Agt. Lawrence Manufg. Co. | Lowell, Mass. | Apr. 24, 1878. |
| S. Odenheimer | Treas. Lane Mills | New Orleans, La. | Oct. 25, 1893. |
| Charles K. Oliver | Treas. Columbia Mills Co. | Columbia, S. C. | Sept. 27, 1894. |
| J. Edward Osborn | Treas. American Linen Co. | Fall River, Mass. | Apr. 28, 1897. |
| Herbert W. Owen | Asst. Supt. Merchants' Mfg. Co. | Fall River, Mass. | Oct. 5, 1899. |
| Oscar L. Owen | Mech. and Mill Eng. Whitin Machine Works | Whitinsville, Mass. | Apr. 25, 1894. |
| Elmer E. Page | Agt. York Manufg. Co. | Saco, Me. | Apr. 27, 1892. |
| Francis J. Parker | Treas. Monadnock Mills, 81 Milk St., | Boston, Mass. | Jan. 15, 1868. |
| O. B. Parker | Supt. U. S. Cotton Co. | Central Falls, R. I. | Apr. 24, 1895. |
| Samuel L. Parker | Supt. Turners Falls Cotton Mills | Box 627, Turners Falls, Mass. | Apr. 29, 1896. |
| Walter E. Parker | Agt. Pacific Mills, 217 Haverhill St., | Lawrence, Mass. | Apr. 25, 1877. |
| John H. Parks | Pres. Wm. Parks & Son, Ltd. | St. John, N. B. | Apr. 24, 1878. |
| Duncan D. Parmly | Treas. Johnson Mfg. Co. and Dunbar Mills Co. | 49 Wall St., New York, N. Y. | Sept. 22, 1896. |
| John W. Pead | Agt. Merrimack Manufg. Co. | Box 1231, Lowell, Mass. | Apr. 26, 1893. |
| James R. Pearce | Supt. Warren Mfg. Co. | Warrenville, S. C. | Oct. 24, 1895. |
| William C. Peirce | Pres. Elizabeth Mills, 564 Eddy St., | Providence, R. I. | Apr. 24, 1895. |
| William D. Pennell | Agt. Hill Manufg. Co. | Lewiston, Me. | Apr. 16, 1873. |
| Haven C. Perham | Treas. Kitson Machine Co. | Lowell, Mass. | Apr. 30, 1879. |

| | | | |
|---|---|---|---|
| Henry C. Phillips | Supt. Atlantic Cotton Mills | Lawrence, Mass. | Apr. 25, 1894. |
| Benjamin Phipps | Treas. Clarendon Mills | 4 Winthrop Sq. Boston, Mass. | Sept. 29, 1898. |
| Albert R. Pierce | Supt. Pierce Mfg. Corp. | New Bedford, Mass. | Oct. 5, 1899. |
| Andrew G. Pierce, Jr. | Treas. Rotch Spinning Co.<br>Treas. Pierce Manufg. Corp.<br>Treas. Howland Mills Corp. | P. O. Box, 34,<br>New Bedford, Mass. | Apr. 24, 1895. |
| Moses Pierce | Pres. Aspinook Co. | 274 Broadway, Norwich, Conn. | Oct. 30, 1878. |
| Reuben Pilling, Jr. | Supt. Granite Mills Co. | 30 Hudson St., Providence, R. I. | Apr. 29, 1896. |
| Charles H. Plummer | Agt. Great Falls Manufg. Co. | Somersworth, N. H. | Apr. 25, 1888. |
| Charles T. Plunkett | Sec. Berkshire Cotton Mfg. Co. | Adams, Mass. | Apr. 28, 1897. |
| Joseph H. Potter, Jr. | Supt. Durfee Mills | Fall River, Mass. | Apr. 27, 1899. |
| J. F. Powers | Supt. Eagle Mill | North Adams, Mass. | Oct. 5, 1899. |
| Herbert L. Pratt | Agt. Bates Manufg. Co. | Lewiston, Me. | Oct. 27, 1875. |
| T. W. Pratt | Pres. West Huntsville Cotton Mill Co. | Huntsville, Ala. | Sept. 22, 1896. |
| John E. Prest | Gen. Supt. Harmony Mills | Cohoes, N. Y. | Apr. 17, 1872. |
| M. W. Quinn | Agt. Hamilton Woolen Co. | Amesbury, Mass. | Oct. 27, 1886. |
| T. G. Ramsdell | Agt. Monument Mills | Housatonic, Mass. | Oct. 30, 1878. |
| Emory S. Rathbun | Supt. Pequot Mills | Montville, Conn. | Apr. 27, 1899. |
| M. A. Rawlinson | Supt. Tremont and Suffolk Mills | Lowell, Mass. | Apr. 24, 1895. |
| Robert Redford | | Lawrence, Mass. | Apr. 26, 1882. |
| R. S. Reinhardt | Treas. and Mgr. Elm Grove Cotton Mills | Lincolnton, N. C. | Apr. 28, 1898. |
| James Renfrew | Treas. Renfrew Manufg. Co. | Adams, Mass. | Oct. 18, 1871. |
| L. B. Renfrew | Asst. Mgr. Renfrew Mfg. Co. | Adams, Mass. | Oct. 5, 1899. |
| Roscoe C. Reynolds | Agt. and Treas. Lewiston Machine Co. | Lewiston, Me. | Oct. 25, 1876. |
| F. H. Rice | 394 Pleasant St., | Worcester, Mass. | Apr. 28, 1880. |
| Charles H. Richardson | Agt. Lancaster Mills | Clinton, Mass. | Apr. 24, 1889. |
| W. H. Richmond | Supt. Bibb Mill No. 2 | Macon, Ga. | Oct. 27, 1897. |
| C. W. Rider | Treas. Merrick Thread Co. | Holyoke, Mass. | Apr. 29, 1896. |
| Charles E. Riley | Textile Machinery | Box 2815<br>281 Congress St., Boston, Mass. | Apr. 25, 1888. |
| George W. Robbins | Supt. Barry Cotton Mill | Smithville, Barre, Mass. | Apr. 28, 1897. |
| Charles D. Robinson | Supt. Crompton Co. | Crompton, R. I. | Sept. 27, 1894. |
| William A. Robinson | Asst. Supt. Social Manufg. Co. | Woonsocket, R. I. | Apr. 29, 1896. |
| John R. Rostron | Overseer of Carding, Lancaster Mills, | Clinton, Mass. | Sept. 29, 1898 |
| John K. Russell | Gen. Mgr. May's Landing Water P. Co. and Millville Manufg. Co. | Millville, N. J. | Apr. 29, 1891. |
| Arnold B. Sanford | Manufrs. Agent American Cotton Yarn Exchange | 45 Milk St.,<br>Boston, Mass. | Oct. 25, 1882. |
| Charles Henry Savage | Supt. Manville Co. | Manville, R. I. | Apr. 26, 1893. |
| Henry B. Sawyer | Asst. Treas. Newmarket Mfg. Co. | 45 Milk St., Boston, Mass. | Oct. 27, 1897. |
| J. Herbert Sawyer | Treas. Newmarket Manufg. Co. | Box 2966, 45 Milk St., Boston, Mass. | July 19, 1865. |

| | | | |
|---|---|---|---|
| F. C. Sayles | Pres. Ponemah Mills | Pawtucket, R. I. | Oct. 27, 1897. |
| George H. Sayward | Mgr. Standard Yarn Co. | Oswego, N. Y. | Oct. 29, 1890. |
| Arnold Schaer | Supt. Warren Manufg. Co. | Warren, R. I. | Apr. 24, 1895. |
| John Scott | | Willimantic, Conn. | Oct. 29, 1879. |
| Charles M. Sears | West Point Mfg. Co. | Langdale, Ala. | Apr. 28, 1898. |
| George H. Shapley | Mgr. Silver Lake Co., 78 Chauncy St., | Boston, Mass. | Apr. 29, 1896. |
| Frank P. Sheldon | Mill Engineer, Industrial Trust Bldg. | Providence, R. I. | Apr. 25, 1894. |
| Thomas C. Sheldon | Agt. Fitchburg Duck Mills | Fitchburg, Mass. | Oct. 29, 1884. |
| Willis S. Shepard | Pres. American Net and Twine Co. 93 Commercial St., | Boston, Mass. | Apr. 29, 1896. |
| William F. Sherman | Civil Engineer 106 New Brazer Bldg., 27 State St., | Boston, Mass. | Apr. 15, 1874. |
| Charles M. Shove | Treas. Granite Mills | Box 45, Fall River, Mass. | Oct. 27, 1875. |
| Herbert H. Shumway | Treas. and Agt. Corr Manufg. Co. | Taunton, Mass. | Apr. 26, 1893. |
| Francis H. Silsbee | Supt. Cotton Dept. Pacific Mills | Lawrence, Mass. | Apr. 27, 1887. |
| N. G. Simonds | Treas. Naumkeag Steam Cotton Co., | Salem, Mass. | Apr. 28, 1898. |
| Louis Simpson | Gen. Mgr. Montreal Cotton Co. | Valleyfield, P. Q. | Apr. 24, 1895. |
| Abbott E. Slade | Treas. Laurel Lake Mill | Fall River, Mass. | Oct. 25, 1893. |
| Arba C. Slater | Supt. Linwood Mill | Linwood, Mass. | Jan. 15, 1868. |
| Arthur T. Smith | Supt. Langley Manufg Co.<br>Supt. Aiken Manufg. Co. | Langley, S. C. | Oct. 24, 1895. |
| Joel Smith | Supt. The J. P. King Manufg. Co. | Augusta, Ga. | Oct. 24, 1895. |
| J. C. Smith | Supt. Chace Mills | Fall River, Mass. | Oct. 27, 1897. |
| James Herbert Smith | Supt. Quinebaug Mills | Danielson, Conn. | Apr. 28, 1898. |
| Robert R. Smith | Mgr. Greenwoods Co. | New Hartford, Conn. | Oct. 19, 1870. |
| Ellison A. Smyth | Pres. Pelzer Manufg. Co. | Pelzer, S. C. | Oct. 26, 1892. |
| William S. Southworth | Agt. Mass. Cotton Mills | Box 1230, Lowell, Mass. | Oct. 31, 1888. |
| S. S. Spencer | Supt. Conestogo Steam Mills | Lancaster, Pa. | Oct. 25, 1876. |
| Wilton H. Spencer | Textile Manuf., | 7 Exchange Pl., Providence, R. I. | Apr. 28, 1898. |
| George E. Spofford | Supt. Readville Cotton Mills | Hyde Park, Mass. | Apr. 29, 1896. |
| Henry B. Sprague | Treas. Boston Woven Hose and Rubber Co. | Cambridgeport, Mass. | Oct. 5, 1899. |
| Leroy Springs | Pres. Lancaster Cotton Mills | Lancaster, S. C. | Oct. 24, 1895. |
| George R. Stearns | Pres. Riverside Mills | Augusta, Ga. | Apr. 30, 1890. |
| Robert Stewart | Supt. Shove Mills | Fall River, Mass. | Apr. 27, 1899. |
| Walter F. Stiles | Treas. Orswell Mills | Fitchburg, Mass. | Oct. 24, 1895. |
| O. W. Stites | | Hoosick Falls, N. Y. | Oct. 24, 1895. |
| Herman F. Straw | Agt. Amoskeag Manufg. Co. | Manchester, N. H. | Oct. 28, 1885. |
| John Sullivan | Supt. Union Cotton Mfg. Co. | Fall River, Mass. | Apr. 27, 1899. |
| Timothy Sullivan | Supt. Davol Mills | Fall River, Mass. | Apr. 27, 1899. |
| Walter H. Summersby | Supt. Pontiac Mill and Bleachery | Pontiac, R. I. | Oct. 25, 1893. |
| James O. Sweet | Agt. and Treas. Ashland Cotton Co. | Jewett City, Conn. | Apr. 28, 1886. |
| Edward P. Taft | Treas. Ponemah Mills | Box 1443, Providence, R. I. | Oct. 28, 1885. |
| Robert Rennie Taft | Supt. Baltic Power Co. | Baltic, Conn. | Apr. 24, 1895. |
| Robert W. Taft | Treas. Coventry Co. | Box 1144, Providence, R. I. | Sept. 27, 1894. |

George P. Taylor . . . Treas. Danielsonville Cotton Co. of Danielson, Conn. . . . . Clinton, Mass. . . . Oct. 27, 1880.
James W. Taylor . . . Supt. Canoe River Mills . Box 46, Taunton, Mass. . . . Oct. 26, 1892.
W. Marshall Taylor . . Supt. Merrick Thread Co. . . . . 6 Arlington St., Holyoke, Mass. . . . Sept. 22, 1896.
Richard Thackeray . . Supt. Weetamoe Mills . . . . . Fall River, Mass. . . Apr. 29, 1885.
Earl A. Thissell . . . . Gen. Mgr. Woonsocket Bobbin Co. Woonsocket, R. I. . . Oct. 30, 1878.
Ariel C. Thomas . . . Supt. Clinton Manufg. Co. . . . . 93 Clinton St., Woonsocket, R. I . . Oct. 31, 1888.
Charles E. Thomas . . Treas. Forestdale Manufg. Co. . . . . 44 Prospect St., Woonsocket, R. I. . . Oct. 31, 1883.
Edward W. Thomas . . Agt. Tremont and Suffolk Mills . . Lowell, Mass. . . . Apr. 30, 1884.
Ralph E. Thomson . . Supt. Parkhill Manufg. Co., Mill C. Fitchburg, Mass. . . Apr. 25, 1894.
D. M. Thompson . . . Pres. & Treas. Corliss Steam Engine Co. . . . . Providence, R. I. . . Oct. 28, 1885.
Joseph S. Tidd . . . . Treas. and Agt. Oakland Mills . . . Taunton, Mass. . . . Apr. 27, 1899.
Horace W. Tinkham . Treas. and Agt. Robeson Mills . . . Fall River, Mass. . . Apr. 27, 1899.
James P. Tolman . . . Pres. Samson Cordage Works . . . . . 115 Congress St., Boston, Mass. . . . Oct. 29, 1890.
D. A. Tompkins . . . Pres. The Atherton Mills . . . . . Charlotte, N. C. . . . Oct. 24, 1895.
George W. Towne . . . Supt. Cotton Dept. Arlington Mills . Lawrence, Mass. . . Oct. 26, 1892.
William E. Trainer . . Pres. D. Trainer & Sons Mfg. Co. . Trainer, Penn. . . . Apr. 21, 1875.
Robert B. Treat . . . . Centerville Cotton Mills . . . . . Centerville, R. I. . . Sept. 27, 1894.
C. H. Truesdell . . . . Supt. Attawaugan Co. . . . . Killingly, Conn. . . Oct. 29, 1884.
Edmund E. Truesdell . Supt. China, Webster & Pembroke Mills . Suncook, N. H. . Apr. 26, 1876.
Oscar B. Truesdell . . Gen. Mgr. Central Mills Co. . . . . Southbridge, Mass. . Oct. 15, 1873.
George F. Tryon . . . Supt. Conanicut Mills, 199 Purchase St., Fall River, Mass. . Apr. 28, 1897.
George E. Tucker . . . Agt. Otis Co. . . . . Ware, Mass. . . . . Oct. 24, 1895.
Charles D. Turnbull . . Treas. Wm. A. Slater Mills Corp. . . . . The Ludlow, Boston Mass. . . . . Oct. 27, 1897.
William D. Twiss . . . Supt. Everett Mills . . . . . Lawrence, Mass. . . April 29, 1896.

Charles T. Upton . . . Supt. Shaw Stocking Co. . . . . Lowell, Mass. . . . Apr. 28, 1897.

George A. Vaughan . . Supt. The Putnam Manufg. Co. . . Putnam, Conn. . . . Sept. 22, 1896.
William P. Vaughan . Agt. Putnam Manufacturing Co. . . . . Banigan Building, Providence, R. I. . . Sept. 29, 1898.
Frank P. Vogl . . . . Agt. Monadnock Mills . . . . . Claremont, N. H. . . Sept. 27, 1894.

Jude C. Wadleigh . . . Supt. Mass. Cotton Mills . . . . . Lowell, Mass. . . . Oct. 26, 1892.
Herbert E. Walmsley . Agt. Wamsutta Mills . . . . . New Bedford, Mass. . Oct. 29, 1890.
Robinson Walmsley . . Supt. Tecumseh Mills . . . . . Fall River, Mass. . . Apr. 27, 1899.
Frederick T. Walsh . . Agt. Lowell Bleachery & Dye Works, Lowell, Mass. . . . Apr. 28, 1897.

| | | | |
|---|---|---|---|
| James A. Walsh | Agt. Lewiston Bleachery and Dye Works | Lewiston, Me. | Apr. 27, 1892. |
| John Waterman | Treas. Warren Manufg. Co. | Warren, R. I. | Apr. 30, 1884. |
| F. E. Wattles | Agt. Boscawen Mills | Penacook, N. H. | Oct. 5, 1899. |
| Joseph W. Wattles | Manufacturers' Supplies | Canton Junction, Mass. | July 18, 1866. |
| George W. Weeks | | Clinton, Mass. | Apr. 21, 1869. |
| W. B. Smith Whaley | Mechanical & Mill Engineer, Pres. Richland Cotton Mills, Granby Cotton Mills, | 1328 Main St., Columbia, S. C. | Apr. 24, 1895. |
| H. D. Wheat | Pres. and Treas. Gaffney Mfg. Co. | Gaffney, S. C. | Apr. 24, 1895. |
| Channing Whitaker | Infringement and Patentability of Inventions | | |
| | Lowell Machine Shop | Lowell, Mass. | Oct. 15, 1873. |
| A. Tenny White | Supt. Manville Co. | Manville, R. I. | Oct. 26, 1887. |
| Charles D. White | Agt. Uncasville Mfg. Co. | Uncasville, Conn. | Oct. 27, 1897. |
| Z. L. White | White Brothers | Winchendon, Mass. | Apr. 28, 1897. |
| Arthur F. Whitin | Pres. Saunders Cotton Mills | Saundersville, Mass. | Apr. 24, 1895. |
| Fred B. Whitin | Agt. Uxbridge Cotton Mills | Linwood, Mass. | Apr. 28, 1897. |
| Henry T. Whitin | Treas Paul Whitin Manufg. Co. | Northbridge, Mass. | Apr. 25, 1877. |
| Alfred N. Whiting | Treas. L. M. Harris Manufg. Co. | Oakdale, Mass. | Apr. 21, 1875. |
| William S. Whitney | Supervising Engineer, American Woolen Co. | Lawrence, Mass. | Apr. 24, 1878. |
| Arthur Whittam | Sec. and Supt. The Enterprise Cotton Mills, Orangeburg, S. C. | | Apr. 28, 1898. |
| William Whittam, Jr. | 52 Samuel Ave., | Pawtucket, R. I. | Apr. 26, 1893. |
| George F. Whitten | Agt. Amory Mfg. Co. | Manchester, N. H. | Oct. 26, 1892. |
| John H. Whitten | Supt. Stark Mills | Manchester, N. H. | Apr. 28, 1898. |
| Edward B. Wilbur | Supt. Newberry Cotton Mills | Newberry, S. C. | Oct. 30, 1889. |
| Henry M. Wilcox | Treas. John Rhodes Warp Co. | Millbury, Mass. | Apr. 24, 1889. |
| Eben C. Willey | Agt. Atlantic Cotton Mills | Lawrence, Mass. | Apr. 29, 1896. |
| Theop. W. Wilmarth | Gen. Supt. Galveston City Cotton Mills, | Galveston, Texas | Oct. 31, 1883. |
| Thomas Wilmarth | Supt. Saunders Cotton Mills | Saundersville, Mass. | Apr. 21, 1875. |
| J. P. Wilson | Treas. Dover Yarn Mills | Charlotte, N. C. | Oct. 24, 1895. |
| George Wood | Pres. and Treas. Millville Manufg. Co. | | |
| | 626 Chestnut St., | Phila., Pa. | Oct. 16, 1872. |
| John P. Wood | Spring Garden and 22d St., | Philadelphia, Pa. | Apr. 28, 1897. |
| C. J. H. Woodbury | Secretary and Treasurer | Lynn, Mass. | Oct. 29, 1879. |
| Adelbert R. Young | Supt. Ashland Cotton Co. | Jewett City, Conn. | Apr. 25, 1894. |
| James M. Young | Mgr. Hamilton Cotton Co. | Hamilton, Ont., Can. | Apr. 27, 1899. |

## ASSOCIATE MEMBERS.

Henry Ashworth . . . Agt. of Elijah Ashworth, Mfg. of Card Clothing . . . . . Fall River, Mass. . . Apr. 28, 1897.

George R. Babbitt . . . Pres. and Gen. Mgr. American Oil Co. . . . . 182 So. Water St., Providence, R. I. . . Apr. 24, 1895.
D. C. Ball . . . . . Gen. Mgr. The American Cotton Co. . . . . 27 William St., New York, N. Y. . . Oct. 24, 1895.
George S. Barnum . . Sec. and Treas. The Bigelow Co. . New Haven, Conn. . Apr. 24, 1895.
Colin C. Bell . . . . Pres. and Treas. Laminar Fibre Co. No. Cambridge, Mass. Apr. 29, 1896.
Frank P. Bennett . . . Publisher American Wool and Cotton Reporter . . . . . 148 Pearl St., Boston, Mass. . . . Sept. 22, 1896.
William H. Bent . . . Treas. Mason Machine Works . . . Taunton, Mass. . . . April 29, 1896.
J. Payson Bradley . . . The Kehew-Bradley Co. . . . . 24 Purchase St., Boston, Mass. . . . Apr. 24, 1895.
J. Frank Braids . . Mgr. Grease & Oil Dept., Charles S. Bush Co. . . . . 212 Weybosset St., Providence, R. I. . . Apr. 28, 1897.
Henry G. Brinckerhoff . N. E. Mgr. Green Fuel Economizer Co., Box 2654 . . . . Room 1053, Exchange Bldg., 53 State St., Boston, Mass. Sept. 22, 1896.
D. Russell Brown . . . Pres. Brown Bros. Co. . . . . Providence, R. I. . . Apr. 24, 1895.
H. Martin Brown . . . Brown Bros. Co. . . . . Providence, R. I. . . Apr. 24, 1895.
Percy H. Brundage . . Commission Merchant, 16 Green St., New York . . . . . Oct. 5, 1899.
John H. Burghardt . . Page Belting Co. . . . 31 Pearl St., Boston, Mass. . . . Apr. 24, 1895.
Eugene E. Burnham . . Belt Mfr. . . . . 252 Lowell St., Lawrence, Mass. . . Oct. 24, 1895.
Fred N. Bushnell . . . Mech. Supt. Narragansett Electric Light Co. . . . . 3 South St., Providence, R. I. . . Sept. 29, 1898.
Harry W. Butterworth . Sec. H. W. Butterworth & Sons . . . . . York and Cedar Sts., Philadelphia, Pa. . . Oct. 27, 1897.
James Butterworth . Pres. H. W. Butterworth & Sons Co. . . . . York and Cedar Sts., Philadelphia, Pa. . . Apr. 24, 1895.

French Campbell . . . Commission Merchant . . . . . Manchester, N. H. . Oct. 27, 1897.
Malcolm Campbell . . Gen. Mgr. Woonsocket Machine and Press Co. . . . . Woonsocket, R. I. . . Apr. 24, 1895.
W. W. Carey . . . . . Machinery and Pulley Manufacturer, Lowell, Mass. . . . . Apr. 24, 1895.
J. E. Cheesman . . . . Gen. Mgr. Cheesman Cotton Gin Co. . . . . 27 William St., New York . . . . . Oct. 5, 1899.
Charles H. Child . . . Treas. Brown Bros. Co. . Box 890, Providence, R. I. . . Apr. 24, 1895.
Henry C. Clark . . . . Treas. Standard Mill Supply Co., Box 714, Providence, R. I. Apr. 28, 1898.
Peter H. Corr . . . . Cotton and Cotton Yarns and Waste . . . . . 38 Court St., Taunton, Mass. . . . Apr. 24, 1895.
C. C. Cowan . . . . . Pres. of Cotton Exchange 316 Front St., Memphis, Tenn. . . Oct. 5, 1899.

| | | | |
|---|---|---|---|
| Thomas G. Cox | Selling Agt. Mason Machine Works | Box 316, Taunton, Mass. | Apr. 24, 1895. |
| George Crompton | Treas. Crompton & Knowles Loom Works | Worcester, Mass. | Oct. 27, 1897. |
| Randolph Crompton | Vice-Pres. and Asst. Supt. Crompton & Knowles Loom Works | Worcester, Mass. | Oct. 27, 1897. |
| C. F. Curwen | Treas. Dinsmore Mfg. Co. | Salem, Mass. | Apr. 27, 1899. |
| Frederick I. Dana | Manager. Thomas Phillips Co. | Providence, R. I. | Apr. 24, 1895. |
| R. H. Deming | Cotton Broker | 10 So. Water St., Providence, R. I. | Apr. 24, 1895. |
| C. E. W. Dow | | 67 Burtt St., Lowell, Mass. | Apr. 24. 1895. |
| Frederick A. Downes | Sec. Factory Mutual Fire Insurance Cos. | 925 Chestnut St., Philadelphia, Pa. | Oct. 27, 1897. |
| G. B. Emmons | Pres. Emmons Loom Harness Co. | Box 456, Methuen Mass. | Oct. 24, 1895. |
| T. C. Entwistle | Cotton Machinery Builder | Cor. Market and Northern Sts., Lowell, Mass. | Apr. 24, 1895. |
| D. D. Felton | Treas. S. A. Felton & Son Co. | Manchester, N. H. | Apr. 24, 1895. |
| John W. Ferguson | Postal Telegraph Bldg., N. Y., and Paterson, N. J. | | Apr. 24, 1895. |
| Redington Fiske | Gen. Mgr. Planters Compress Co. | 89 State St., Boston, Mass. | Apr. 27, 1899. |
| J. Herbert Foster | Cotton Broker | 10 South Water St., Providence, R. I. | Apr. 24, 1895. |
| Merrill A. Furbush | Pres. M. A. Furbush & Son Machine Co. | 428-430 Philadelphia Bourse, Philadelphia, Pa. | Oct. 27, 1897. |
| John T. Fyans | Agt. Fyans, Frazer & Blackway Co. | 411 Beach St., Fall River, Mass. | Apr. 28, 1897. |
| H. P. Garland | Treas. Loom Picker Co. | Biddeford, Me. | Oct. 24, 1895. |
| Royal W. Gates | Josiah Gates & Sons, Belting | 307 Market St., Lowell, Mass. | Apr. 24, 1895. |
| Rufus B. Goff | Pres. Standard Mill Supply Co. | 77 Exchange Pl., Box 714, Providence, R. I. | Apr. 28, 1897. |
| Sumner S. Gould | Mgr. Lowell Branch American Card Clothing Co. | Lowell, Mass. | Oct. 5, 1899. |
| William S. Granger | Prest. Granger Foundry & Machine Co., | Providence, R. I. | Apr. 24, 1895. |
| Henry T. Grant, Jr. | Pres. Mercantile Mutual Fire Ins. Co. | Box 1153, 723 Banigan Building, Providence, R. I. | Oct. 27, 1897. |
| W. B. Hammond | Engineer A. A. Griffing Iron Co. | 177 Fort Hill Sq., Boston, Mass. | Oct. 5, 1899. |
| A. Walter Harris | Treas. A. W. Harris Oil Co. | 326 So. Water St., Providence, R. I. | Oct. 24, 1895. |

| | | | |
|---|---|---|---|
| Alfred H. Hartley | Dealer in Oils and Mill Supplies | Box 409, Fall River, Mass. | Oct. 27, 1897. |
| Jerome Hill | Pres. Tennessee Planters' Co. | 334 Front St., Memphis, Tenn. | Apr. 29, 1896. |
| John Hogg | Smith, Hogg & Gardiner, 140 Essex St., | Boston, Mass. | Apr. 27, 1899. |
| Henry A. Holcomb | | Box 249, New Bedford, Mass. | Oct. 24, 1895. |
| Henry S. Houghton, Sr., | Mfr. Grids and Beaters | 61 Pond St., Woonsocket, R. I. | Apr. 28, 1897. |
| C. H. Hutchins | Pres. Crompton & Knowles Loom Works | Worcester, Mass. | Oct. 24, 1895. |
| W. L. Hutchins | Asst. Mgr. Crompton & Knowles Loom Works | Providence, R. I. | Apr. 28, 1898. |
| David Jackson | Pres. and Mgr. Jackson Pat. Shell Roll Co. | Pawtucket, R. I. | Apr. 24, 1895. |
| James H. Kendall | Edward Kendall & Sons | Cambridgeport, Mass., | Sept. 29, 1898. |
| John E. Kendrick | Vice-Pres. American Supply Co. | Providence, R. I. | Oct. 5, 1899. |
| Frank B. Kenney | Kitson Machine Co. | Lowell, Mass. | Oct. 5, 1899. |
| William B. Kehew | The Kehew-Bradley Co. | 24 Purchase St., Boston, Mass. | Apr. 24, 1895. |
| W. C. Langford | Oil Dealer, | 86 Weybosset St., Providence, R. I. | Apr. 27, 1899. |
| Josiah M. Lasell | Asst. Treas. Whitin Machine Works, | Whitinsville, Mass. | Apr. 24, 1895. |
| John H. Lorimer | Builder of Textile Machines | Ontario and Lawrence Sts., Philadelphia, Pa. | Oct. 27, 1897. |
| Stephen C. Lowe | Mill Supplies | 87 Union St., New Bedford, Mass. | Oct. 24, 1895. |
| George A. Lowry | Consulting Eng. Planters' Comp. Co., | 89 State St., Boston, Mass. | Apr. 28, 1898. |
| F. H. Maynard | Bus. Mgr. Gen. Fire Extinguisher Co., | Providence, R. I. | Apr. 24, 1895. |
| H. G. McKerrow | Textile Machinery | 31 State St., Boston, Mass. | Sept. 22, 1896. |
| George H. Meader | Steam Appliances | 35 Oliver St., Boston, Mass. | Apr. 24, 1895. |
| George B. Morison | Selling Agt. Hadley Co. | 95 Milk St., Boston, Mass. | Apr. 24, 1895. |
| George C. Newell | Starkweather & Shepley | 17 Custom House St., Providence, R. I. | Sept. 29, 1898. |
| William R. Noone | Mfr. Roller and Slasher Cloth | 100 Pearl St., Boston, Mass. | Oct. 27, 1897. |
| Sidney B. Paine | General Electric Co., | 200 Summer St., Boston, Mass. | Apr. 24, 1895. |
| Arthur Parkinson | Selling Agt. Arabol Mfg. Co., | 13 Gold St., New York, N. Y. | Apr. 28, 1897. |
| Stephen Minot Pitman | Sec'y Narragansett Mutual Fire Insurance Co. | Box 315, Providence, R. I. | Apr. 24, 1895. |

| | | | |
|---|---|---|---|
| Vladimir P. Polevoy | Agent Great Yaroslavskaia Cotton Mill (of Yaroslave), Russia | 120 Broadway, N. Y. | Apr. 28, 1897. |
| Charles A. M. Praray | Chas. A. M. Praray & Co., Mill Architect and Engineer | 832 and 833 Banigan Building, Providence, R. I. | Apr. 28, 1897. |
| Charles F. Randall | Expert in Textiles | Room 350, Tremont Building, Boston, Mass. | Apr. 24, 1895. |
| Peleg A. Rhodes | Inspector of Cotton Mills | P. O. Box 315, Providence, R. I. | Oct. 5, 1899. |
| Richard H. Rice | Treas. Providence Engineering Work | 521 So. Main St., Providence, R. I. | Apr. 24, 1895. |
| C. E. Roberts | Mgr. Hartford Steam Boiler Insurance & Inspection Co. | 125 Milk St., Boston, Mass. | Apr. 24, 1895. |
| Louis E. Robinson | Cotton Agent Sea Island Cotton | Box 1216, 20 Market Square, Providence, R. I. | Oct. 27, 1897. |
| John M. Russell | Asst. Treas. Crompton & Knowles Loom Works | Worcester, Mass. | Oct. 24, 1895. |
| H. T. Schaefer | Sterling Coal Co., 5 Custom House St., Boston, Mass., | | Sept. 29, 1898. |
| John E. Searles | Pres. Am. Cotton Co., 27 William St., New York | | Oct. 5, 1899. |
| E. A. Smith | Pres. Charlotte Supply Co. | Charlotte, N. C. | Oct. 24, 1895. |
| Harry M. Smith | Vice-Pres. Standard Mill Supply Co. | 77 Exchange Pl., Box 714, Providence, R. I. | Apr. 28, 1897. |
| R. Paul Snelling | Treas. Saco and Pettee Machine Shops | Newton Upper Falls, Mass. | Sept. 22, 1896. |
| Lewis R. Speare | Treas. and Gen. Mgr. The Alden Speare's Sons Co., Oil and Mill Supplies | 369 Atlantic Ave., Boston, Mass. | Oct. 24, 1895. |
| Henry C. Spence | Gen. Mgr. Metallic Drawing Roll Co. | Indian Orchard, Mass. | Apr. 24, 1895. |
| George W. Stafford | Mgr. Crompton & Knowles Loom Works | Providence, R. I. | Apr. 24, 1895. |
| James Strang | Selling Agt. Metallic Drawing Roll Co. | 123 Hampden St., Indian Orchard, Mass. | Oct. 27, 1897. |
| William H. Stratton | Mgr. Factory Insurance Association | 95 Pearl St., Hartford, Conn. | Apr. 28, 1897. |
| Daniel J. Sully | Cotton Broker, T. M. Reynolds & Co., | 34 South Water St., Providence, R. I. | Apr. 24, 1895. |
| Cyrus A. Taft | Agt. Whitin Machine Works | Whitinsville, Mass. | Apr. 24, 1895. |
| Charles F. Taylor | Owner & Mgr. Burgess Cop Tube Co., | 48 Custom House St., Providence, R. I. | Apr. 28, 1898. |
| Winthrop Thayer | Pres. Thayer & Co., Incorp. | 1015 Tremont Bldg., Boston, Mass. | Apr. 29, 1896. |
| A. Curtis Tingley | Treas. National Ring Traveler Co. | 7 Eddy St., Providence, R. I. | Sept. 22, 1896. |

| | | | |
|---|---|---|---|
| William V. Threlfall | Selling Agt. Saco and Pettee Machine Shops | Biddeford, Me. | Apr. 24, 1895. |
| Frank H. Underwood | Resident Mgr. Dodge Mfg. Co. | 137 Purchase St., Boston, Mass. | Apr. 29, 1896. |
| Justin A. Ware | Sales Mgr. Crompton & Knowles Loom Works | Worcester, Mass. | Oct. 24, 1895. |
| Arthur J. Warren | Star Harness Co. | Fall River, Mass. | Apr. 27, 1899. |
| Lettice R. Washburn | Mill Contractor, 235 North Water St., | New Bedford, Mass. | Oct. 5, 1899. |
| Walter S. Watson | Haworth & Watson, Mfrs. Paper Tubes for Textile Manufg. | Box 996, Lowell, Mass. | Oct. 24, 1895. |
| Stephen M. Weld, | Cotton Buyer | 89 State St., Boston, Mass. | Apr. 27, 1899. |
| William R. West | Roll Coverer | 830 Purchase St., New Bedford, Mass. | Sept. 22, 1896. |
| W. W. White | Agent Holyoke Machine Co. | Worcester, Mass. | Apr. 27, 1899. |
| G. Marston Whitin | Treas. Whitin Machine Works | Whitinsville, Mass. | Apr. 24, 1895. |
| Fred A. Wilde | Asst. Mgr. The A. T. Atherton Machine Co. | Pawtucket, R. I. | Apr. 28, 1897. |
| Erving Yale Woolley | Stoddard, Haserick, Richards & Co. | 152 Congress St., Boston, Mass. | Apr. 24, 1895. |

| | |
|---|---|
| Honorary Members | 4 |
| Active Members | 465 |
| Associate Members | 111 |
| Total Membership | 580 |

# MEMBERS OF THE ASSOCIATION,

## Oct. 5, 1899.

ARRANGED BY STATES.

### MAINE.

| | | |
|---|---|---|
| Auburn | William Hayes | Barker Mill. |
| Biddeford | James G. Garland | 10 Adams St. |
| Biddeford | H. P. Garland | Loom Picker Co. |
| Biddeford | Robert McArthur | Pepperell Mfg. Co. |
| Biddeford | William V. Threlfall | Saco & Pettee Machine Shops. |
| Brunswick | Russell W. Eaton | Cabot Manufg. Co. |
| Kennebunk | Robert W. Lord | R. W. Lord & Co. |
| Lewiston | George W. Bean | Androscoggin Mills. |
| Lewiston | H. B. Estes | Continental Mills. |
| Lewiston | William D. Pennell | Hill Manufg. Co. |
| Lewiston | Herbert L. Pratt | Bates Manufg. Co. |
| Lewiston | Roscoe C. Reynolds | Lewiston Machine Co. |
| Lewiston | James A. Walsh | Lewiston Bleachery and Dye Works |
| Lisbon | W. H. Miles | Farwell Mills. |
| Saco | Elmer E. Page | York Manufg. Co. |
| Sanford | Louis B. Goodall | Goodall Worsted Co. |
| Westbrook | Philip Dana | Dana Warp Mills. |
| Westbrook | Woodbury K. Dana | Dana Warp Mills. |

### NEW HAMPSHIRE.

| | | |
|---|---|---|
| Charlestown | Samuel Webber | Hydraulic Engineer. |
| Claremont | Frank P. Vogl | Monadnock Mills. |
| Dover | John Browne | Cocheco Manufg. Co. |
| Dover | Charles H. Fish | Cocheco Manufg. Co. |
| Dover | John Holland | 12 Trackey St. |

| | | |
|---|---|---|
| Exeter | Hervey Kent | Exeter Manufg. Co. |
| Greenville | Frederick W. Ely | Columbian Manufg. Co. |
| Manchester | Stephen N. Bourne | Stark Mills. |
| Manchester | French Campbell | Commission Merchant. |
| Manchester | George A. Clark | Manchester Mills. |
| Manchester | D. D. Felton | S. A. Felton & Son Co. |
| Manchester | Elliott Cowdin Lambert | Amoskeag Manufg. Co. |
| Manchester | Charles H. Manning | Amoskeag Manufg. Co. |
| Manchester | Charles D. McDuffie | Manchester Mills. |
| Manchester | Herman F. Straw | Amoskeag Manufg. Co. |
| Manchester | George F. Whitten | Amory Manufg. Co. |
| Manchester | John H. Whitten | Stark Mills. |
| Milford | M. F. Foster | |
| Milford | Frank E. Kaley | Morse & Kaley Manufg. Co. |
| Nashua | William D. Cadwell | Nashua Manufg. Co. & Jackson Co. |
| Nashua | Roscoe S. Milliken | Nashua Mfg. Co. |
| Penacook | F. E. Wattles | Boscawen Mills. |
| Pittsfield | George E. Kent | Exeter Manufg. Co. |
| Salmon Falls | O. S. Brown | Salmon Falls Manufg. Co. |
| Somersworth | Charles H. Plummer | Great Falls Manufg. Co. |
| Suncook | David L. Jewell | China, Webster & Pembroke Mills. |
| Suncook | Edmund E. Truesdell | China, Webster & Pembroke Mills. |

**VERMONT.**

| | | |
|---|---|---|
| North Pownal | Thomas Armstrong | North Pownal Manufg. Co. |

**MASSACHUSETTS.**

| | | |
|---|---|---|
| Adams | John S. Adams, Jr. | Adams Bros. Manufg. Co. |
| Adams | James C. Chalmers | Renfrew Mfg. Co. |
| Adams | Z. D. Hall | Berkshire Cotton Manufg. Co. |
| Adams | A. B. Mole | Greylock Mill. |
| Adams | Charles T. Plunkett | Berkshire Cotton Manufg. Co. |
| Adams | James Renfrew | Renfrew Manufg. Co. |
| Adams | L. B. Renfrew | Renfrew Mfg. Co. |
| Amesbury | Henry D. Martin | |
| Amesbury | M. W. Quinn | Hamilton Woolen Co. |
| Andover | John W. Bell | Smith & Dove Manufg. Co. |
| Belmont | John Kilburn | |
| Blackstone | Edward A. Mongeon | Blackstone Manufg. Co. |
| Bondsville | B. A. Alexander | Boston Duck Co. |
| Bondsville | Elmer G. Childs | Boston Duck Co. |
| Boston | Charles B. Amory | 70 Kilby St. |
| Boston | Frederic Amory | 40½ Water St. |

| | | |
|---|---|---|
| Boston | Edward Atkinson | 31 Milk St. |
| Boston | E. W. Atkinson | 152 Congress St. |
| Boston | Joseph P. Battles | 150 Devonshire St. |
| Boston | Frank P. Bennett | 148 Pearl St. |
| Boston | J. Payson Bradley | 24 Purchase St. |
| Boston | Henry G. Brinckerhoff | 53 State St. |
| Boston | John H. Burghardt | 31 Pearl St. |
| Boston | Alfred Clarke, | Mech. Eng., 23 Central St. |
| Boston | Frank B. Comins | 150 Devonshire St., Room 67. |
| Boston | Alphonse S. Covel | 70 Kilby St. |
| Boston | P. Y. DeNormandie | 30 Kilby St. |
| Boston | Ambrose Eastman | 53 State St. |
| Boston | William Firth | 150 Devonshire St. |
| Boston | Redington Fiske | 89 State St. |
| Boston | Alfred M. Goodale | 50 State St. |
| Boston | Stephen Greene | 131 Devonshire St. |
| Boston | W. B. Hammond | A. A. Griffing Iron Co. |
| Boston | Franklin W. Hobbs | Arlington Mills. |
| Boston | John Hogg | 140 Essex St. |
| Boston | Henry S. Howe | 68 Chauncy St. |
| Boston | William B. Kehew | 24 Purchase St. |
| Boston | Evan Arthur Leigh | 70 Kilby St. |
| Boston | William C. Lovering | 40 Water St. |
| Boston | George A. Lowry | 89 State St. |
| Boston | Herbert Lyman | 112 Beach St. |
| Boston | Charles T. Main | 1112 Exchange Building. |
| Boston | Fred C. McDuffie | 40 Water St. |
| Boston | H. G. McKerrow | 31 State St. |
| Boston | George H. Meader | 35 Oliver St. |
| Boston | George B. Morison | 95 Milk St. |
| Boston | William R. Noone | 100 Pearl St. |
| Boston | Sidney B. Paine | 200 Summer St. |
| Boston | Francis J. Parker | 81 Milk St. |
| Boston | Benjamin Phipps | 4 Winthrop Sq. |
| Boston | Charles F. Randall | 350 Tremont Building. |
| Boston | Charles E. Riley | 281 Congress St. |
| Boston | C. E. Roberts | 125 Milk St. |
| Boston | Arnold B. Sanford | 45 Milk St. |
| Boston | Henry B. Sawyer | 45 Milk St. |
| Boston | J. Herbert Sawyer | 45 Milk St. |
| Boston | H. T. Schaefer | 5 Custom House St. |
| Boston | George H. Shapley | 78 Chauncy St. |
| Boston | Willis S. Shepard | 93 Commercial St. |
| Boston | William F. Sherman | 27 State St. |
| Boston | Lewis R. Speare | 369 Atlantic Ave. |
| Boston | Winthrop Thayer | 1015 Tremont Building. |
| Boston | James P. Tolman | 115 Congress St. |

| | | |
|---|---|---|
| Boston | Charles D. Turnbull | The Ludlow. |
| Boston | Frank H. Underwood | 137 Purchase St. |
| Boston | Stephen M. Weld | Cotton Buyer, 89 State St. |
| Boston | Erving Yale Woolley | 152 Congress St. |
| Cambridgeport | James H. Kendall | Edward Kendall & Sons. |
| Cambridgeport | Henry B. Sprague | Boston Woven Hose & Rubber Co. |
| Canton Junction | Joseph W. Wattles | Manufacturers' Supplies. |
| Chicopee Falls | Henry A. Bailey | Chicopee Manufg. Co. |
| Clinton | William G. McLoon | Lancaster Mills. |
| Clinton | Charles H. Richardson | Lancaster Mills. |
| Clinton | John R. Rostron | Lancaster Mills. |
| Clinton | George P. Taylor | Danielsonville Cotton Co. |
| Clinton | George W. Weeks | |
| Fall River | F. S. Akin | Cornell Mills. |
| Fall River | Henry Ashworth | Agt. for Card Clothing Manufr. |
| Fall River | John P. Bodge | Arkwright Mills. |
| Fall River | Jefferson Borden, Jr. | Fall River Bleachery. |
| Fall River | Nathaniel B. Borden | Barnard Manufg. Co. |
| Fall River | Richard B. Borden | Troy C. & W. Manufg. Co. |
| Fall River | Thomas J. Borden | Richard Borden Manufg. Co. |
| Fall River | Isaac A. Brown | Narragansett Mills. |
| Fall River | George A. Chace | Bourne Mills. |
| Fall River | Simeon B. Chase | King Phillip Mills. |
| Fall River | John A. Collins | American Linen Co. |
| Fall River | B. D. Davol | Barnard Manufg. Co. |
| Fall River | Frank H. Dwelly | Tecumseh Mills. |
| Fall River | David H. Dyer | 7 and 8 Pocasset Bank Building. |
| Fall River | William Evans | Richard Borden Manufg. Co. |
| Fall River | John T. Fyans | 411 Beach St. |
| Fall River | Daniel Gilligan | Pocasset & Metacomet Mills. |
| Fall River | Effingham C. Haight | Wampanoag Mills. |
| Fall River | A. M. Hamilton | Parker Mills. |
| Fall River | John F. Hamlet | P. O. Box 160. |
| Fall River | Alfred H. Hartley | Oils and Mill Supplies. |
| Fall River | Samuel E. Hathaway | Fall River Iron Works Co. |
| Fall River | William Hathaway | Barnard Mfg. Co. |
| Fall River | William B. Hawes | North Dighton Cotton Co. |
| Fall River | George H. Hills | Davol Mills and Stevens Mfg. Co. |
| Fall River | Edward B. Jennings | N. E. Cotton Yarn Co. |
| Fall River | Benjamin B. Kirk | 2107 South Main St. |
| Fall River | George H. Law | 815 Walnut St. |
| Fall River | Leontine Lincoln | Seaconnet Mills. |
| Fall River | John R. Mason | 439 Middle St. |
| Fall River | Philip A. Mathewson | King Philip Mills. |
| Fall River | Thomas McAuliffe | Stevens Manufg. Co. |
| Fall River | J. Edward Osborne | American Linen Co. |

| | | |
|---|---|---|
| Fall River | Herbert W. Owen | Merchants' Mfg. Co. |
| Fall River | Joseph H. Potter, Jr. | Durfee Mills. |
| Fall River | Charles M. Shove | Granite Mills. |
| Fall River | J. C. Smith | Chace Mills. |
| Fall River | Robert Stewart | Shove Mills. |
| Fall River | John Sullivan | Union Cotton Manufg. Co. |
| Fall River | Timothy Sullivan | Davol Mills. |
| Fall River | Abbott E. Slade | Laurel Lake Mills. |
| Fall River | Richard Thackeray | Weetamoe Mills. |
| Fall River | Horace W. Tinkham | Robeson Mills. |
| Fall River | George F. Tryon | 199 Purchase St. |
| Fall River | Robinson Walmsley | Tecumseh Mills. |
| Fall River | Arthur J. Warren | Star Harness Co. |
| Fiskdale | John Gregson | Fiskdale Mills. |
| Fitchburg | George P. Grant, Jr. | Grant Yarn Co. |
| Fitchburg | W. E. Keach | 123 Myrtle Ave. |
| Fitchburg | John Leiper | Fitchburg Worsted Mills. |
| Fitchburg | Arthur H. Lowe | Parkhill Manufg Co. |
| Fitchburg | David Lowe | Parkhill Manufg. Co. |
| Fitchburg | Thomas C. Sheldon | Fitchburg Duck Mills. |
| Fitchburg | Walter F. Stiles | Orswell Mills. |
| Fitchburg | Ralph E. Thomspon | Parkhill Manufg. Co. |
| Great Barrington | Jno. H. C. Church | Monument Mills. |
| Griswoldville | James C. Deane | Griswoldville Manufg. Co. |
| Holyoke | Jones S. Davis | 6 Newton Street. |
| Holyoke | John W. Dickinson | Lyman Mills. |
| Holyoke | Ernest Lovering | Lyman Mills. |
| Holyoke | C. W. Rider | Merrick Thread Co. |
| Holyoke | W. Marshall Taylor | Merrick Thread Co. |
| Hopedale | Eben S. Draper | Draper Co. |
| Hopedale | George A. Draper | Draper Co. |
| Hopedale | George Otis Draper | Draper Co. |
| Hopedale | William F. Draper | Draper Co. |
| Hopedale | William F. Draper, Jr. | Draper Co. |
| Housatonic | T. G. Ramsdell | Monument Mills. |
| Hyde Park | George E. Spofford | Readville Cotton Mills. |
| Indian Orchard | William C. Godfrey | Indian Orchard Co. |
| Indian Orchard | Henry C. Spence | Metallic Drawing Roll Co. |
| Indian Orchard | James Strang | 123 Hampden St. |
| Ipswich | James W. Brown | Box 312. |
| Lawrence | William A. Barrell | Lawrence Duck Co. |
| Lawrence | Eugene E. Burnham | 252 Lowell St. |
| Lawrence | Frederick E. Clarke | Pres. B. & L. R. R. |
| Lawrence | William J. Hadfield | 225 Bailey St. |
| Lawrence | William D. Hartshorne | Arlington Mills. |
| Lawrence | James I. Milliken | Everett Mills. |

| | | |
|---|---|---|
| Lawrence | Walter E. Parker | 217 Haverhill St. |
| Lawrence | Henry C. Phillips | Atlantic Cotton Mill. |
| Lawrence | Robert Redford | |
| Lawrence | Francis H. Silsbee | Pacific Mills. |
| Lawrence | George W. Towne | Arlington Mills. |
| Lawrence | William D. Twiss | Everett Mills. |
| Lawrence | William S. Whitney | American Woolen Co. |
| Lawrence | Eben C. Willey | Atlantic Cotton Mills. |
| Leicester | Charles A. Denny | American Card Clothing Co. |
| Linwood | Arba C. Slater | Linwood Mill. |
| Linwood | Fred B. Whitin | Uxbridge Cotton Mills. |
| Lowell | George E. Ames | Lawrence Manufg. Co. |
| Lowell | Frank A. Bowen | Appleton Co. |
| Lowell | Edward N. Burke | Lowell Machine Shop. |
| Lowell | W. W. Carey | Machinery and Pulley Manufacturer |
| Lowell | Clarence N. Childs | 43 Pine St. |
| Lowell | Alonzo A. Coburn | Atherton Machine Co. |
| Lowell | A. G. Cumnock | Appleton Co. |
| Lowell | Albert W. Danforth | 881 Bridge St. |
| Lowell | Edward P. Dennis | Lowell Machine Shop. |
| Lowell | C. E. W. Dow | 67 Burtt St. |
| Lowell | William A. Eastman | Lowell Hosiery Co. |
| Lowell | T. C. Entwistle | Cor. Market and Northern Sts. |
| Lowell | James T. Ferguson | Boott Mills. |
| Lowell | Frederick A. Flather | Lowell Machine Shop. |
| Lowell | Royal W. Gates | 307 Market St. |
| Lowell | Sumner S. Gould | Lowell Branch Am. Card Clo. Co. |
| Lowell | William E. Hall | Shaw Stocking Co. |
| Lowell | James G. Hill | Merrimack House. |
| Lowell | George L. Hooper | 7 Belmont Street. |
| Lowell | Frank B. Kenney | Kitson Machine Co. |
| Lowell | Nathaniel B. Kerr | Boott Cotton Mills. |
| Lowell | Alvin S. Lyon | Lowell Manufg. Co. |
| Lowell | Albert H. Morton | Kitson Machine Co. |
| Lowell | Oliver H. Moulton | Hamilton Manufg. Co. |
| Lowell | Franklin Nourse | Lawrence Manufg. Co. |
| Lowell | John W. Pead | Merrimac Manufg. Co. |
| Lowell | Haven C. Perham | Kitson Machine Co. |
| Lowell | M. A. Rawlinson | Tremont & Suffolk Mills. |
| Lowell | William S. Southworth | Mass. Cotton Mills. |
| Lowell | Edward W. Thomas | Tremont and Suffolk Mills. |
| Lowell | Charles T. Upton | Shaw Stocking Co. |
| Lowell | Jude C. Wadleigh | Mass. Cotton Mills. |
| Lowell | Frederick T. Walsh | Lowell Bleachery & Dye Works. |
| Lowell | Walter S. Watson | Haworth & Watson. |
| Lowell | Channing Whitaker | Lowell Machine Shop. |

| | | |
|---|---|---|
| Lynn | C. J. H. Woodbury | Secy. and Treas. |
| Manchaug | Charles M. Holmes | Manchaug Co. |
| Methuen | Lewis E. Barnes | Pemberton Co. and Methuen Co. |
| Methuen | G. B. Emmons | Emmons Loom Harness Co. |
| Millbury | Fred W. Moore | Cordis Mills. |
| Millbury | Henry M. Wilcox | John Rhodes Warp Co. |
| New Bedford | George A. Ayer | 123 Fifth St. |
| New Bedford | Christopher P. Brooks | New Bedford Textile School. |
| New Bedford | Robert Burgess | Grinnell Mfg. Corp. |
| New Bedford | Byron F. Card | Howland Mills. |
| New Bedford | William W. Crapo | Wamsutta Mills. |
| New Bedford | Frederick Grinnell | Gen. Fire Extinguisher Co. |
| New Bedford | Henry A. Holcomb | Box 249. |
| New Bedford | Thomas Horsfield | 95 Bonney St. |
| New Bedford | Walter H. Langshaw | Dartmouth Manufg. Corp. |
| New Bedford | Stephen C. Lowe | 87 Union St. |
| New Bedford | Albert R. Pierce | Pierce Mfg. Corporation. |
| New Bedford | Andrew G. Pierce, Jr. | Box 34. |
| New Bedford | Herbert E. Walmsley | Wamsutta Mills. |
| New Bedford | Lettice R. Washburn | 235 North Water St. |
| New Bedford | William R. West | 830 Purchase St. |
| Newton | Josiah G. Coburn | |
| Newton Upper Falls | Frank J. Hale | Saco and Pettee Machine Shops. |
| Newton Upper Falls | R. P. Snelling | Saco and Pettee Machine Shops. |
| North Adams | Hervey Burnham | Beaver Mills and Eclipse Mill. |
| North Adams | Charles W. Dennett | Johnson Manufg. Co. and Dunbar Mills Co. |
| North Adams | J. F. Powers | Eagle Mill. |
| Northbridge | Henry S. Houghton, Jr. | Paul Whitin Manufg. Co. |
| Northbridge | Henry T. Whitin | Paul Whitin Manufg. Co. |
| North Cambridge | Colin C. Bell | Laminar Fibre Co. |
| North Oxford | Edwin N. Bartlett | Sigourney and Rockdale Mills. |
| North Plymouth | Gideon F. Holmes | Plymouth Cordage Co. |
| Oakdale | William B. Fittz | W. Boylston Manufg. Co. |
| Oakdale | Alfred N. Whiting | L. M. Harris Manufg. Co. |
| Salem | C. F. Curwen | Dinsmore Mfg. Co. |
| Salem | William P. McMullen | Naumkeag Steam Cotton Co. |
| Salem | N. G. Simonds | Naumkeag Steam Cotton Co. |
| Saundersville | Arthur F. Whitin | Saunders Cotton Mills. |
| Saundersville | Thomas Wilmarth | Saunders Cotton Mills. |
| Shattuckville | Frank S. Field | Massaemit Yarn Mills. |
| Smithville, Barre | George W. Robbins | Barre Cotton Mill. |
| Southbridge | Oscar B. Truesdell | Central Mills Co. |
| South Hadley Falls | William R. Hill | Glasgow Manufg. Co. |
| Springfield | Joseph M. Dunham | 43 Edwards St. |
| Taunton | A. C. Bent | Safety Seamless Pocket Co. |

| | | |
|---|---|---|
| Taunton | William H. Bent | Mason Machine Works. |
| Taunton | John J. Connell | Cohannet Mills. |
| Taunton | Peter H. Corr | 38 Court St. |
| Taunton | Thomas G. Cox | Mason Machine Works. |
| Taunton | P. T. Creed | Hopewell Mills. |
| Taunton | H. H. Culver | Elizabeth Poole Mills. |
| Taunton | Henry S. Culver | Westville Cotton Mill. |
| Taunton | Herbert Fisher | |
| Taunton | Abbott F. Lawrence | Winthrop Cotton Yarn Co. |
| Taunton | Henry M. Lovering | Whittenton Manufg. Co. |
| Taunton | William M. Lovering | Whittenton Manufg. Co. |
| Taunton | Charles L. Macomber | Winthrop Cotton Yarn Co. |
| Taunton | John Tempest Meats | Mason Machine Works. |
| Taunton | Herbert H. Shumway | Corr Manufg. Co. |
| Taunton | James W. Taylor | Canoe River Mills. |
| Taunton | Joseph S. Tidd | Oakland Mills. |
| Thorndike | Charles H. Hobbs | Thorndike Co. |
| Three Rivers | Roscius C. Newell | Palmer Mill. |
| Turners Falls | Samuel L. Parker | Turners Falls Cotton Mills. |
| Waltham | Charles L. Bailey | Boston Manufg. Co. |
| Waltham | Arthur C. Freeman | 97 Church St. |
| Waltham | Charles E. Getchell | 35 Willow St. |
| Ware | George E. Tucker | The Otis Co. |
| Webster | Ernest E. Clark | H. N. Slater Mills. |
| West Warren | George A. Moody | Warren Cotton Mills. |
| Whitinsville | Alfred E. Adams | Whitinsville Cotton Mills and Linwood Mills. |
| Whitinsville | Josiah M. Lasell | Whitin Machine Works. |
| Whitinsville | Oscar L. Owen | Whitin Machine Works. |
| Whitinsville | Cyrus A. Taft | Whitin Machine Works. |
| Whitinsville | G. Marston Whitin | Whitin Machine Works. |
| Williamstown Sta. | Roland R. Kelly | Williamstown Manufg. Co. |
| Winchendon | Z. L. White | White Brothers. |
| Worcester | George Crompton | Crompton & Knowles Loom Works. |
| Worcester | Randolph Crompton | Crompton & Knowles Loom Works. |
| Worcester | Henry F. Harris | Room 509, State Mutual Building. |
| Worcester | C. H. Hutchins | Crompton & Knowles Loom Works. |
| Worcester | F. H. Rice | 394 Pleasant St. |
| Worcester | John M. Russell | Crompton & Knowles Loom Works. |
| Worcester | Justin A. Ware | Crompton & Knowles Loom Works. |
| Worcester | W. W. White | Holyoke Machine Co. |

## RHODE ISLAND.

| | | |
|---|---|---|
| Allenton | R. A. Gray | Rodman Manufg. Co. |
| Ashton | Arthur H. Gulliver | Lonsdale Co. |

| | | |
|---|---|---|
| Auburn | Albert F. Knight | |
| Bayside | Abel T. Atherton | Machine Maker. |
| Central Falls | Stephen L. Adams | Stafford Manufg. Co. |
| Central Falls | Louis B. Barker | United States Cotton Co. |
| Central Falls | B. F. G. Linnell | P. O. Box 645. |
| Central Falls | O. B. Parker | U. S. Cotton Co. |
| Centreville | Harold Lawton | Warwick Mills. |
| Centreville | Robert B. Treat | Centreville Cotton Mills. |
| Crompton | Charles D. Robinson | Crompton Co. |
| Davisville | Walter B. Knight | Reynolds Manufg. Co. |
| Fiskville | James Gee | Interlaken Dye Works. |
| Georgiaville | Herbert R. Farnum | Bernon Mills. |
| Hamilton | Joseph Warren Greene | Hamilton Web Co. |
| Manville | Charles Henry Savage | Manville Co. |
| Manville | A. Tenny White | Manville Co. |
| Natick | Webster Knight | Natick Mills. |
| Pawtucket | William W. Blades | 135 Mineral Spring Ave. |
| Pawtucket | William P. Dempsey | Dempsey Bleachery & Dye Works. |
| Pawtucket | John J. Hart | Charlton Manufg. Co. |
| Pawtucket | David Jackson | Jackson Pat. Shell Roll Co. |
| Pawtucket | J. E. Jenckes | The E. Jenckes Manufg. Co. |
| Pawtucket | Ira J. Martin | 62 Conant St. |
| Pawtucket | James R. MacColl | Lorraine Manufg. Co. |
| Pawtucket | F. C. Sayles | Ponemah Mills. |
| Pawtucket | William Whittam, Jr. | 52 Samuel Ave. |
| Pawtucket | Fred A. Wilde | A. T. Atherton Machine Co. |
| Peace Dale | William C. Greene | Peace Dale Manufg. Co. |
| Phenix | Henry R. Brown | Hope Co. and Phenix Mill. |
| Pontiac | Walter H. Summersby | Pontiac Mill and Bleachery. |
| Providence | Charles T. Aldrich | Aldrich Manufg. Co. |
| Providence | William Ames | 47 Charles St. |
| Providence | H. C. Atwood | Williamsville Manufg. Co. |
| Providence | George R. Babbitt | 182 South Water St. |
| Providence | Truman Beckwith | Dyerville Manufg. Co. |
| Providence | J. Frank Braids | 212 Weybosset St. |
| Providence | A. W. Brainerd | 3 Washington Row. |
| Providence | D. Russell Brown | Brown Bros. Co. |
| Providence | H. Martin Brown | Brown Bros. Co. |
| Providence | E. C. Bucklin | Harris Manufg. Co. and Interlaken Mills. |
| Providence | Fred N. Bushnell | Narragansett Electric Light Co. |
| Providence | Charles H. Child | Brown Bros. Co. |
| Providence | Henry C. Clark | Standard Mill Supply Co. |
| Providence | Frederick I. Dana | Thomas Phillips Co. |
| Providence | A. Lockwood Danielson | Quinebaug Co. |
| Providence | J. DeForest Danielson | Lockwood Co. and Lewiston Bleachery and Dye Works. |

| | | |
|---|---|---|
| Providence | John W. Danielson | Lockwood Co. |
| Providence | R. H. Deming | 10 South Water St. |
| Providence | J. Herbert Foster | 10 South Water St. |
| Providence | William Gammell | Berkeley Co. |
| Providence | Rufus B. Goff | 77 Exchange Place. |
| Providence | William B. Gowdey | 40 Clifford St. |
| Providence | William S. Granger | Granger Foundry & Machine Co. |
| Providence | Henry T. Grant, Jr. | 723 Banigan Building. |
| Providence | David Grove | 610 Manton Avenue. |
| Providence | John H. Hambley | 49 Westminster St. |
| Providence | A. Walter Harris | 326 South Water St. |
| Providence | Elisha H. Howard | 309 Butler Exchange. |
| Providence | W. L. Hutchins | Crompton & Knowles Loom Works. |
| Providence | John E. Kendrick | American Supply Co. |
| Providence | Joseph H. Kendrick | American Supply Co. |
| Providence | Jesse A. Knight | Lawton Spinning Co. |
| Providence | Stephen A. Knight | Hebron Manufg. Co. |
| Providence | W. C. Langford | 86 Weybosset St. |
| Providence | Charles Warren Lippitt | Silver Spring B. & D. Co. |
| Providence | Henry F. Lippitt | Social and Manville Cos. |
| Providence | Charles R. Makepeace | Mill Engineer. |
| Providence | F. H. Maynard | Gen. Fire Extinguisher Co. |
| Providence | Thomas Mayor | 26 Olney St. |
| Providence | George C. Newell | 17 Custom House St. |
| Providence | William C. Peirce | 564 Eddy St. |
| Providence | Reuben Pilling, Jr. | 30 Hudson St. |
| Providence | Stephen Minot Pitman | Narragansett Mutual Fire Ins. Co. |
| Providence | Charles A. M. Praray | 832-833 Banigan Building. |
| Providence | Peleg A. Rhodes | Banigan Building. |
| Providence | Richard H. Rice | 521 South Main St. |
| Providence | Louis E. Robinson | 20 Market Square. |
| Providence | Frank P. Sheldon | Industrial Trust Building. |
| Providence | Harry M. Smith | 77 Exchange Place. |
| Providence | Wilton H. Spencer | 7 Exchange Place. |
| Providence | George W. Stafford | Crompton & Knowles Loom Works. |
| Providence | Daniel J. Sully | T. M. Reynolds & Co. |
| Providence | Edward P. Taft | Ponemah Mills. |
| Providence | Robert W. Taft | Coventry Co. |
| Providence | Charles F. Taylor | 48 Custom House St. |
| Providence | D. M. Thompson | Corliss Steam Engine Co. |
| Providence | A. Curtis Tingley | 7 Eddy St. |
| Providence | William P. Vaughan | Banigan Building. |
| Quidnick | Albert Knight | Quidnick Mills. |
| Riverpoint | Arthur F. Brackett | Royal Arctic and Valley Queen. |
| Riverpoint | C. Prescott Knight | Riverpoint Corp. |
| Slatersville | Charles F. Farrar | Wm. A. Slater Mills Corp. |

| | | |
|---|---|---|
| Slatersville | William P. Holt | Wm. A. Slater Mills Corp. |
| Valley Falls | Andrew J. Currier | Albion & Valley Falls Co. |
| Warren | Arnold Schaer | Warren Manufg. Co. |
| Warren | John Waterman | Warren Manufg. Co. |
| Westerly | Louis L. Hohn | 122 High St. |
| Woonsocket | Malcolm Campbell | Woonsocket Mach. & Press Co. |
| Woonsocket | Charles H. Gorton | Glenark Knitting Co. |
| Woonsocket | Henry S. Houghton, Sr. | 61 Pond St. |
| Woonsocket | Albert C. Hoy | Hamlet Mills. |
| Woonsocket | Charles H. Merriman, Jr. | Globe Mill. |
| Woonsocket | William A. Robinson | Social Manufg. Co. |
| Woonsocket | Earl A. Thissell | Woonsocket Bobbin Co. |
| Woonsocket | Ariel C. Thomas | 93 Clinton St. |
| Woonsocket | Charles E. Thomas | 44 Prospect St. |

## CONNECTICUT.

| | | |
|---|---|---|
| Baltic | Robert Rennie Taft | Baltic Power Co. |
| Danielson | James Herbert Smith | Quinebaug Mills. |
| Hartford | William H. Stratton | 95 Pearl St. |
| Jewett City | J. Colby Lewis | Wm. A. Slater Mills Corp. |
| Jewett City | James O. Sweet | Ashland Cotton Co. |
| Jewett City | Adelbert R. Young | Ashland Cotton Co. |
| Killingly | W. E. Atwood | Williamsville Manufg. Co. |
| Killingly | C. H. Truesdell | Attawaugan Co. |
| Montville | Emory S. Rathbun | Pequot Mills. |
| New Hartford | Robert R. Smith | Greenwoods Co. |
| New Haven | George S. Barnum | The Bigelow Co. |
| No. Grosvenor Dale | Frank M. Messenger | Grosvenor Dale Co. |
| Norwich | W. N. Blackstone | Attawaugan Co. and Totokett Mills Co. |
| Norwich | W. R. Burnham | |
| Norwich | C. H. Frisbie | Attawaugan Co. |
| Norwich | Marcellus Gould | 85 Sachem St. |
| Norwich | W. G. Henderson | Shetucket Co. |
| Norwich | Moses Pierce | 274 Broadway. |
| Putnam | George W. Holt | Monohansett Manufg. Co. |
| Putnam | George A. Vaughan | Putnam Manufg. Co. |
| Taftville | Joseph D. Aiken | Ponemah Mills. |
| Taftville | John Eccles | Ponemah Mills. |
| Uncasville | Charles D. White | Uncasville Manufg. Co. |
| Wauregan | James A. Atwood | Wauregan Mills & Quinebaug Co. |
| Wauregan | John Walter Atwood | Wauregan Mills. |
| Willimantic | E. S. Boss | Willimantic Linen Co. |
| Willimantic | John Scott | |
| Windsor Locks | J. R. Montgomery | The J. R. Montgomery Co. |

## NEW YORK.

| | | |
|---|---|---|
| Capron | W. H. Cloher, Jr. | Utica Cotton Co. |
| Chadwicks | Bradford C. Divine | Utica Willow Vale Bleaching Co. |
| Cohoes | David S. Johnston | Cohoes Iron Foundry & Machine Co. |
| Cohoes | John E. Prest | Harmony Mills. |
| Hoosick Falls | O. W. Stites | |
| New York City | George Arms | Grand Hotel. |
| New York City | Edwin H. Baker | 117 Duane St. |
| New York City | D. C. Ball | American Cotton Co. |
| New York City | Edward R. Ballou | 540 West 23rd St. |
| New York City | Percy H. Brundage | 16 Greene St. |
| New York City | J. E. Cheesman | Cheesman Cotton Gin Co. |
| New York City | John W. Ferguson | Postal Telegraph Building. |
| New York City | Dudley T. Lyall | 541 West 23rd St. |
| New York City | William L. Lyall | 540 West 23rd St. |
| New York City | Arthur B. Mann | 99 Franklin St. |
| New York City | Arthur Parkinson | 13 Gold St. |
| New York City | Duncan D. Parmly | 49 Wall St. |
| New York City | Vladimir P. Polevoy | 120 Broadway. |
| New York City | John E. Searles | American Cotton Co. |
| New York Mills, Oneida Co., | John P. Campbell, | New York Mills. |
| Oswego | George H. Sayward | Standard Yarn Co. |
| Utica | George DeForest | Utica Steam Cotton Mills. |
| Utica | D. W. Gray | Skenandoa Cotton Co. |
| Utica | Henry F. Mansfield | Utica Steam Cotton Mills and Mohawk Valley Cotton Mills. |
| Victory Mills | Joseph O. Hannum | Saratoga Victory Manufg. Co. |

## NEW JERSEY.

| | | |
|---|---|---|
| Gloucester City | Philip H. Fowler | |
| Jersey City | Ernest Bridge | Jas. Chadwick & Bro. Ltd. |
| Jersey City | Maxwell Grierson | Jas. Chadwick & Bro., Ltd. |
| Millville | John K. Russell | May's Landing Water Power Co. and Millville Mfg. Co. |
| Newark | William H. Loftus | Clark Thread Co. |

## PENNSYLVANIA.

| | | |
|---|---|---|
| Chester | D. Edwin Irving | The Irving & Leiper Manufg. Co. |
| Chester | W. T. Galey | Aberfoyle Manufg. Co. |
| Lancaster | S. S. Spencer | Conestoga Steam Mills. |
| Mt. Joy | Thomas J. Brown | George Brown's Sons. |
| Philadelphia | Robert Beatty | Coral and Adams Sts. |

| | | |
|---|---|---|
| Philadelphia | T. Ashby Blythe | 114 Chestnut St. |
| Philadelphia | Harry W. Butterworth | York and Cedar Sts. |
| Philadelphia | James Butterworth | York and Cedar Sts. |
| Philadelphia | Frederick A. Downes | 925 Chestnut St. |
| Philadelphia | Edward W. France | N. W. Cor. Broad and Pine Sts. |
| Philadelphia | Merrill A. Furbush | 428-430 Philadelphia Bourse. |
| Philadelphia | Joshua Garsed | Wingohocking Mills and National Spinning Co., Frankford. |
| Philadelphia | H. S. Grove | 218 Race St. |
| Philadelphia | W. C. Houston | 333 Drexel Building. |
| Philadelphia | John H. Lorimer | Ontario and Lawrence Sts. |
| Philadelphia | David Milne | Washington Ave. and 11th St. |
| Philadelphia | George Wood | 626 Chestnut St. |
| Philadelphia | John P. Wood | Spring Garden and 22nd Sts. |
| Trainer | William E. Trainer | D. Trainer & Sons Mfg. Co. |

### DELAWARE.

| | | |
|---|---|---|
| Wilmington | William P. Bancroft | Joseph Bancroft & Sons Co. |
| Wilmington | Daniel Moore Bates, Jr. | Joseph Bancroft & Sons Co. |

### MARYLAND.

| | | |
|---|---|---|
| Baltimore | James A. Gary | 108 W. German St. |

### NORTH CAROLINA.

| | | |
|---|---|---|
| Charlotte | R. M. Miller, Jr. | Atherton Mills. |
| Charlotte | E. A. Smith | Charlotte Supply Co. |
| Charlotte | D. A. Tompkins | Atherton Mills. |
| Charlotte | J. P. Wilson | Dover Yarn Mills. |
| Greensboro | Edward T. Garsed | Hucomuga Mills. |
| Hope Mills | Frank H. Cotton | Hope Mills Mfg. Co. |
| Kings Mountain | Philip S. Baker | Crowders Mt. Cotton Mills. |
| Kings Mountain | F. Dilling | Dilling Cotton Mills. |
| Kings Mountain | C. E. Falls | Enterprise Mills. |
| Lincolnton | R. S. Reinhardt | Elm Grove Cotton Mills. |
| Mountain Island | W. T. Jordan | Mt. Island Manufg. Co. |

### SOUTH CAROLINA.

| | | |
|---|---|---|
| Chester | William G. Nichols | Springsteine Mills. |
| Columbia | Charles K. Oliver | Columbia Mills Co. |
| Columbia | W. B. Smith-Whaley | 1328 Main St. |
| Gaffney | H. D. Wheat | Gaffney Manufg. Co. |
| Lancaster | Leroy Springs | Lancaster Cotton Mills. |

| | | |
|---|---|---|
| Langley | Arthur T. Smith | Langley Manufg. Co. and Aiken Manufg. Co. |
| Newberry | Edward B. Wilbur | Newberry Cotton Mills. |
| Orangeburg | Arthur Whittam | The Enterprise Cotton Mills. |
| Orangeburg | Samuel Dibble | The Enterprise Cotton Mills. |
| Pelzer | B. F. Guy | Pelzer Manufg. Co. |
| Pelzer | Ellison A. Smyth | Pelzer Manufg. Co. |
| Warrenville | James R. Pearce | Warren Mfg. Co. |

**GEORGIA.**

| | | |
|---|---|---|
| Atlanta | Oscar Elsas | Fulton Bag and Cotton Mills. |
| Atlanta | Henry E. Fisher | Atlanta Cotton Mills. |
| Atlanta | William M. Nixon | Atlanta Woolen Mills. |
| Augusta | Otis G. Lynch | Enterprise Manufg. Co. |
| Augusta | Joel Smith | J. P. King Mfg. Co. |
| Augusta | George R. Stearns | Riverside Mills. |
| Columbus | E. N. Clemence | Eagle & Phenix Mills. |
| Griffin, Spalding Co. | Albert G. Martin | Kincaid Manufg. Co. |
| La Grange, | Samuel Hale | Dixie Cotton Mills. |
| Lindale | Edward C. Beach | Mass. Mills In Georgia. |
| Macon | W. H. Richmond | Bibb Mill No. 2. |

**TENNESSEE.**

| | | |
|---|---|---|
| Knoxville | William T. Lang | Brookside Mills. |
| Memphis | C. C. Cowan | Cotton Exchange. |
| Memphis | Jerome Hill | 334 Front St. |
| Nashville | T. B. Dallas | Phenix Cotton Mills, Dallas Mfg. Co. |

**LOUISIANA.**

| | | |
|---|---|---|
| New Orleans | S. Odenheimer | Lane Mills. |

**KENTUCKY.**

| | | |
|---|---|---|
| Henderson | Paul J. Marrs | Henderson Cotton Mills. |

**ALABAMA.**

| | | |
|---|---|---|
| Cordova | Albert W. Dimick | Indian Head Mills. |
| Huntsville | A. W. Hunking | Merrimack Mfg. Co. |
| Huntsville | T. W. Pratt | West Huntsville Cotton Mill Co. |
| Langdale | Charles M. Sears | West Point Mfg. Co. |

### TEXAS.

| | | |
|---|---|---|
| Galveston | Lawrence V. Elder | 212 Tremont St. |
| Galveston | Theop. W. Wilmarth | Galveston City Cotton Mills. |
| Waco | Jno. Hopkinson | Slayden & Kirksey Woolen Mills. |

### CANADA.

#### Province of Ontario.

| | | |
|---|---|---|
| Hamilton, Ont. | Charles Owen Dexter | The Canadian Colored Cotton Mills Co., Ltd. |
| Hamilton, Ont. | A. T. Malcomson | 92 Hunter St. |
| Hamilton, Ont. | James M. Young | Hamilton Cotton Co. |

#### Province of Quebec.

| | | |
|---|---|---|
| Cornwall, P. Q. | S. Greenwood | Canadian Col'd Cot. Mills Co. |
| Hochelaga, P. Q. | W. S. Hume | 176 Notre Dame St. |
| Montreal, P. Q. | Alfred Hawkesworth | Merchants Cotton Co. |
| Montreal, P. Q. | Fred Hawkesworth | Merchants Cotton Co. |
| Magog, P. Q. | Harry W. Kimball | Dominion Cotton Mills Co. |
| Valleyfield, P. Q. | Fred Lacey | Montreal Cotton Co. |
| Valleyfield, P. Q. | Louis Simpson | Montreal Cotton Co. |

### NEW BRUNSWICK.

| | | |
|---|---|---|
| Marysville | John B. Cudlip | Gibson Cotton Mills. |
| Milltown | Lewis Dexter, Jr. | The Canadian Colored Cotton Mills Co., Ltd. |
| Milltown | Farquharson J. Muir | The Canadian Colored Cotton Mills Co., Ltd. |
| St. John | John H. Parks | Wm. Parks & Son, Ltd. |

## RECAPITULATION.

### LOCATION OF MEMBERSHIP.

| | |
|---|---|
| Maine | 18 |
| New Hampshire | 27 |
| Vermont | 1 |
| Massachusetts | 286 |
| Rhode Island | 107 |
| Connecticut | 28 |
| New York | 25 |
| New Jersey | 5 |
| Pennsylvania | 19 |
| Delaware | 2 |
| Maryland | 1 |
| North Carolina | 11 |
| South Carolina | 12 |
| Georgia | 11 |
| Tennessee | 4 |
| Louisiana | 1 |
| Kentucky | 1 |
| Alabama | 4 |
| Texas | 3 |
| Province of Ontario | 3 |
| Province of Quebec | 7 |
| New Brunswick | 4 |
| | 580 |

# IN MEMORIAM.

## EDWARD P. TAFT.

EDWARD P. TAFT, a man who has always been in the front rank among the cotton manufacturers of New England, died at his home in Pawtuxet, R. I., November 5, 1899. He had been in failing health since September, 1896, and had been seriously ill since the last of June of this year.

Mr. TAFT was best known as the Treasurer of the Ponemah Mill at Taftville, Conn., and had held that position since the mill was started in 1867. He was in reality the builder of the mill, and its developement was his life work. It has a capacity of 118,000 spindles, and the main building is said to be the largest single building devoted to the manufacture of cotton goods now in the Eastern States.

EDWARD P. TAFT was born in Providence in 1835. He attended the old University Grammar School at College Hill, and graduated from Brown University in 1854. He was a member of the Psi Upsilon fraternity, and ranked very high in scholarship. He traveled in Europe for a year or two and then received a mercantile training in his father's office, becoming a member of the firm in 1858. His father died in 1865, and since then he has been the active financial manager of the firm. For several years he was connected with the Wauregan Mills, which were under the control of his firm.

In October, 1865, he purchased a mill privilege and 600 acres

of land lying along the banks of the Shetucket river four miles above Norwich. At the point selected there was ample water power afforded by a fall of about 30 feet, and the land occupied by the company on both sides of the river was in close proximity to the Norwich and Worcester Railroad and to tide-water navigation, and he established the Ponemah Mill, which was started Nov. 16, 1871. It was intended from the first to manufacture the finer fabrics, like lawns, cambrics, and other goods then largely imported; and that policy was carried out with success. In process of time the Ponemah has extended widely the range of goods manufactured.

Mr. TAFT was a director of the Providence and Stonington Steamship Company, and was identified with the New York steamboat travel from the early sixties. He was also director of several insurance companies. He was a member of the Board of Trade and of the New England Cotton Manufacturers' Association, of which he was elected a member October 28, 1885, and was one of the oldest members of the Central Congregational Church.

He was a quiet and unassuming man, and was possessed of great energy and determination. A widow and eight children survive him.

## FREDERICK E. CLARKE.

FREDERICK EMERSON CLARKE, the fifteenth President of this Association, died suddenly at his home in Lawrence, Mass., on Monday, November 6, 1899, completing an active and honorable career, excelling in an unusual number of lines of work for which he was fitted by his abilities and sustained by continuous good health.

He was born December 13, 1834, at Watertown, Mass., moved to Lawrence, where he graduated from the high school and prepared for college. At the age of 17 he was apprenticed to the

machinist's trade at the Lawrence Machine Shop, in 1851, for the period of two years, at the end of which time he was employed by the Pacific Mills on the construction of buildings and in the arrangement of cotton machinery. In 1861 he became manufacturing agent of the Pemberton Manufacturing Company of Lawrence, Mass. In 1866 he took in addition a similar position for the Methuen Cotton Company of Methuen, Mass., and in 1872 two Mills at Salem, Mass., engaged in the manufacture of jute bagging for the covering of cotton bales. He carried all of these responsibilities in an able manner until January 1, 1898, when he retired from active connection with textile manufacturing.

He was fond of association with his fellow men, and recognized the debt that a man owes to the town he lives in.

The extent to which his associates valued his sound judgment and appreciated the benefit of his presence, is shown by the number of organizations and corporations with whose management he was affiliated.

He was President and one of the few charter members of this Association, president of the Boston & Lowell Railroad Company, Boston-Duenweg Zinc Company, Lawrence Savings Bank, Board of Trade, City Mission, Good Government Association, and Park Commission. He was on the board of directors in several manufacturing corporations, a trustee of the Lowell Textile School, director of the Home Market Club, director of the Bay State National Bank of Lawrence, member of the Advisory Board of the Philadelphia Museums, and recently had been appointed by the Governor as one of the managers for Massachusetts of the Pan-American Exposition to be held at Buffalo in 1901. He was a member of the American Society of Mechanical Engineers, the Monday Night Club of Lawrence, the Boston Art Club, the Home Club of Lawrence, and was actively engaged in the work of the Unitarian Church at Lawrence.

During the summer he lived on his extensive farm in the adjoining town of North Andover, where he identified himself with local interests as president of the Village Improvement Society and also as a member of the North Andover Club.

The breadth of his mental scope is shown by the number of different pursuits and occupations in which he excelled and held a leading position. He thoroughly understood a number of branches of textile manufacturing, in which he had made many contributions to the systematic methods of operation and of cost finding. He was conversant with the engineering problems of mill construction, of water and steam power, and as a shrewd business man his financial ability was widely recognized both by manufacturers and bankers.

His success in engineering construction and methods of manufacturing was not limited to the mills under his charge, but he was called in as an adviser by other mill corporations, and after his retirement as an active manufacturer he was in great demand as an expert in the construction and valuation of mill plants and water power. He carried a great load of responsibilities without confusion and was able to control others without irritation. He was a courteous and genial presiding officer, but firmly keeping a meeting to the matters under consideration.

The effect of his sound reading was shown in his aptitude as a clear and logical speaker, fluent and even eloquent to a rare degree for one whose career had been devoted entirely to technical affairs in mill and office where achievements follow actions not words. His brilliant opening address at the Montreal meeting was appreciated by the hosts at the Canadian Metropolis and will be remembered with satisfaction by the Association.

# PROCEEDINGS.

In accordance with the legal notice, the stated semi-annual meeting of the Association was held at Windsor Hotel, Montreal, P. Q., October 5th and 6th, 1899. The badge for this meeting consisted of an enamelled stud, bearing on the field the flags of the United States and the Dominion of Canada with flagstaffs per saltire, and environed by hanks of cotton yarn. The following 189 members and guests were present:

MEMBERS.

THOMAS ARMSTRONG, North Pownal, Vt.
H. C. ATWOOD, Providence, R. I.
ROBERT BEATTY, Philadelphia, Pa.
J. FRANK BRAIDS, Providence, R. I.
HENRY G. BRINCKERHOFF, Boston, Mass.
CHRISTOPHER P. BROOKS, New Bedford, Mass.
ROBERT BURGESS, New Bedford, Mass.
EUGENE E. BURNHAM, Lawrence, Mass.
HARRY W. BUTTERWORTH, Philadelphia, Pa.
WILLIAM D. CADWELL, Nashua, N. H.
JOHN P. CAMPBELL, New York Mills, N. Y.
W. W. CAREY, Lowell, Mass.
J. E. CHEESMAN, New York, N. Y.
HENRY C. CLARK, Providence, R. I.
FREDERICK E. CLARKE, Lawrence, Mass.

FRANK B. COMINS, Boston, Mass.
THOMAS G. COX, Taunton, Mass.
ANDREW J. CURRIER, Valley Falls, R. I.
C. F. CURWEN, Salem, Mass.
CHARLES W. DENNETT, North Adams, Mass.
EDWARD P. DENNIS, Lowell, Mass.
CHARLES A. DENNY, Leicester, Mass.
C. E. W. DOW, Lowell, Mass.
GEORGE OTIS DRAPER, Hopedale, Mass.
JOSEPH M. DUNHAM, Springfield, Mass.
G. B. EMMONS, Methuen, Mass.
T. C. ENTWISTLE, Lowell, Mass.
D. D. FELTON, Manchester, N. H.
WILLIAM FIRTH, Boston, Mass.
FREDERICK A. FLATHER, Lowell, Mass.
M. F. FOSTER, Milford, N. H.
H. P. GARLAND, Biddeford, Me.
ROYAL W. GATES, Lowell, Mass.
RUFUS B. GOFF, Providence, R. I.
CHARLES H. GORTON, Woonsocket, R. I.
SUMNER S. GOULD, Lowell, Mass.
WILLIAM S. GRANGER, Providence, R. I.
D. W. GRAY, Utica, N. Y.
ARTHUR H. GULLIVER, Ashton, R. I.
ALFRED H. HARTLEY, Fall River, Mass.
WILLIAM B. HAWES, Fall River, Mass.
ALFRED HAWKESWORTH, Montreal, P. Q.
FRED HAWKESWORTH, Montreal, P. Q.
JEROME HILL, Memphis, Tenn.
GEORGE W. HOLT, Putnam, Conn.
WILLIAM P. HOLT, Slatersville, R. I.
HENRY S. HOUGHTON, Jr., Northbridge, Mass.
D. EDWIN IRVING, Chester, Pa.
DAVID JACKSON, Pawtucket, R. I.
ROLAND R. KELLY, Williamstown Station, Mass.
JOHN E. KENDRICK, Providence., R. I.
FRANK B. KENNEY, Lowell, Mass.
NATHANIEL B. KERR, Lowell, Mass.
HARRY W. KIMBALL, Magog, P. Q., Can.

STEPHEN A. KNIGHT, Providence, R. I.
WEBSTER KNIGHT, Natick, R. I.
FRED LACEY, Valleyfield, P. Q.
W. C. LANGFORD, Providence, R. I.
ARTHUR H. LOWE, Fitchburg, Mass.
STEPHEN C. LOWE, New Bedford, Mass.
HENRY F. MANSFIELD, Utica, N. Y.
CHARLES D. MCDUFFIE, Manchester, N. H.
R. M. MILLER, Jr., Charlotte, N. C.
WILLIAM R. NOONE, Boston, Mass.
WALTER E. PARKER, Lawrence, Mass.
ARTHUR PARKINSON, New York, N. Y.
JOSEPH H. POTTER, Jr., Fall River, Mass.
JOHN E. PREST, Cohoes, N. Y.
CHARLES H. RICHARDSON, Clinton, Mass.
THOMAS C. SHELDON, Fitchburg, Mass.
LOUIS SIMPSON, Valleyfield, P. Q.
J. C. SMITH, Fall River, Mass.
S. S. SPENCER, Lancaster, Pa.
WILTON H. SPENCER, Providence, R. I.
HENRY B. SPRAGUE, Lynn, Mass.
WALTER F. STILES, Fitchburg, Mass.
WALTER H. SUMMERSBY, Pontiac, R. I.
JAMES W. TAYLOR, Taunton, Mass.
JAMES P. TOLMAN, Boston, Mass.
D. A. TOMPKINS, Charlotte, N. C.
GEORGE W. TOWNE, Lawrence, Mass.
GEORGE E. TUCKER, Ware, Mass.
HERBERT E. WALMSLEY, New Bedford, Mass.
JUSTIN A. WARE, Worcester, Mass.
WILLIAM R. WEST, New Bedford, Mass.
W. W. WHITE, Worcester, Mass.
ALFRED N. WHITING, Oakdale, Mass.
JOHN H. WHITTEN, Manchester, N. H.
EDWARD B. WILBUR, Newberry, S. C.
FRED A. WILDE, Pawtucket, R. I.
C. J. H. WOODBURY, Lynn, Mass.

GUESTS.

Fr. Jac. Andres, Boston, Mass.
J. J. Ashworth, Toronto, Ontario.
A. A. Ayer, Montreal, P. Q.
W. W. Ballagh, New York, N. Y.
R. H. Bartholomew, Montreal, P. Q.
Arthur R. Bush, Boston, Mass.
Herbert C. Chase, Pawtucket, R. I.
Charles P. Conant, Lowell, Mass.
J. A. Cooper, Whitinsville, Mass.
Byron Eldred, Boston, Mass.
A. F. Gault, Montreal, P. Q.
W. E. Gower, Montreal, P. Q.
Otis W. Greeley, Boston, Mass.
Dr. W. H. Hammond, Montreal, P. Q.
W. H. Hartford, Pawtucket, R. I.
M. A. Hays, Boston, Mass.
H. E. Hitchcock, Holyoke, Mass.
Mr. Hitchon, Accrington, England.
Carroll Hutchins, Boston, Mass.
William Hyde, Denton, Manchester, England.
J. J. Jackson, Montreal, P. Q.
Joseph R. Jackson, Suncook, N. H.
Richard Johnson, Oldham, England.
Walter N. Lane, Boston, Mass.
D. K. McLaren, Montreal, P. Q.
E. L. Merrow, Providence, R. I.
John Morse, Montreal, P. Q.
W. C. Nairn, North Cambridge, Mass.
John Parkhill, Fitchburg, Mass.
W. H. Perkins, Boston, Mass.
Amasa Pratt, Lowell, Mass.
Raymond Prefontaine, Q. C. M. P., Montreal.
J. G. F. Randolph, Boston, Mass.
H. L. Stafford, Montreal, P. Q.
George F. Steele, Boston, Mass.
R. R. Stevenson, Montreal, P. Q.
Henry P. Thompson, Boston, Mass.

J. J. THORNE, Montreal, P. Q.
J. B. WILDE, Utica, N. Y.
R. W. WITHYCOMB, Utica, N. Y.
R. S. WRIGHT, Montreal, P. Q.
Mrs. FR. JAC. ANDRES, Boston, Mass.
Miss MARIA ANDRES, Boston, Mass.
Mrs. THOMAS ARMSTRONG, North Pownal, Vt.
Mrs. H. C. ATWOOD, Providence, R. I.
Mrs. R. H. BARTHOLOMEW, Montreal, P. Q.
Mrs. CHRISTOPHER P. BROOKS, New Bedford, Mass.
Mrs. FRENCH CAMPBELL, Manchester, N. H.
Mrs. W. W. CAREY, Lowell, Mass.
Mrs. HERBERT C. CHASE, Pawtucket, R. I.
Miss E. C. CHENEY, West Newton, Mass.
Mrs. FREDERICK E. CLARKE, Lawrence, Mass.
Mrs. THOMAS G. COX, Taunton, Mass.
Mrs. CHARLES F. CURWEN, Salem, Mass.
Mrs. CHARLES A. DENNY, Leicester, Mass.
Miss BERTHA G. DENNY, Leicester, Mass.
Mrs. T. C. ENTWISTLE, Lowell, Mass.
Mrs. D. D. FELTON, Manchester, N. H.
Mrs. WILLIAM FIRTH, Boston, Mass.
Mrs. M. F. FOSTER, Milford, N. H.
Mrs. H. P. GARLAND, Biddeford, Me.
Mrs. A. M. GROVER, North Andover, Mass.
Mrs. ARTHUR H. GULLIVER, Ashton, R. I.
Mrs. D. F. HAYDEN, Providence, R. I.
Mrs. JEROME HILL, Memphis, Tenn.
Miss MARY FLORENCE HOLT, Putnam, Conn.
Mrs. JOSEPH R. JACKSON, Suncook, N. H.
Mrs. DAVID JACKSON, Pawtucket, R. I.
Mrs. JOHN E. KENDRICK, Providence, R. I.
Mrs. NATHANIEL B. KERR, Lowell, Mass.
Mrs. ARTHUR H. LOWE, Fitchburg, Mass.
Mrs. STEPHEN C. LOWE, New Bedford, Mass.
Mrs. E. L. MERROW, Providence, R. I.
Mrs. WALTER E. PARKER, Lawrence, Mass.
Mrs. JOHN PARKHILL, Fitchburg, Mass.
Mrs. W. H. PERKINS, Boston, Mass.

Mrs. AMASA PRATT, Lowell, Mass.
Mrs. JOHN E. PREST, Cohoes, N. Y.
Mrs. FRANCES M. RICHARDS, Washington, D. C.
Mrs. CHARLES H. RICHARDSON, Clinton, Mass.
Mrs. J. C. SMITH, Fall River, Mass.
Mrs. S. S. SPENCER, Lancaster, Pa.
Mrs. WILTON H. SPENCER, Providence, R. I.
Mrs. HENRY B. SPRAGUE, Lynn, Mass.
Mrs. WALTER F. STILES, Fitchburg, Mass.
Mrs. JAMES P. TOLMAN, Boston, Mass.
Mrs. GEORGE E. TUCKER, Ware, Mass.
Miss RUTH TUCKER, Ware, Mass.
Mrs. HERBERT E. WALMSLEY, New Bedford, Mass.
Mrs. JUSTIN A. WARE, Worcester, Mass.
Mrs. WILLIAM R. WEST, New Bedford, Mass.
Mrs. W. W. WHITE, Worcester, Mass.
Miss MARY E. WHITING, Oakdale, Mass.
Mrs. JOHN H. WHITTEN, Manchester, N. H.
Miss E. H. WILBUR, Newberry, S. C.
Mrs. FRED A. WILDE, Pawtucket, R. I.
Mrs. C. J. H. WOODBURY, Lynn, Mass.
Miss ALICE P. WOODBURY, Lynn, Mass.

# FIRST SESSION.

WINDSOR HOTEL, MONTREAL, P. Q.,
Thursday, October 5, 1899.

Meeting called to order at 10 A. M., President FREDERICK E. CLARKE in the chair.

The PRESIDENT. Gentlemen of the Association, it becomes my duty to call you to order and ask the Secretary to read the call for this meeting.

The Secretary read the following call to the meeting.

CALL TO SEMI-ANNUAL MEETING NO. 67.
MONTREAL, P. Q., CANADA.

BOSTON, MASS., September 15, 1899.

*To the Members:*

Notice is hereby given that the stated semi-annual meeting of the Association will be held at the Windsor Hotel, Montreal, P. Q., Canada on Thursday and Friday, October 5-6, 1899.

The first session will be called to order at 10 A. M., on Thursday, when the members of the Association will be welcomed to the city by His Worship, the Mayor of Montreal and Presidents of cotton companies.

The detailed programme will not be issued until the meeting, but the arrangements, which include the ladies as well as the members of the Association, will include the following: Thursday, the second session at

4.00 P. M. At 2.30 P. M. a drive around the mountain in carriages and return to the hotel. 8.00 P. M., third session.

The fourth session on Friday morning will be devoted to an excursion. At 9.00 A. M. a special train furnished by the courtesy of the General Electric Company of Schenectady, New York and the Canadian General Electric Company, Limited, of Toronto, Ontario, will leave the Grand Trunk Railway Station for Valleyfield, where, as the guests of our members, Mr. LOUIS SIMPSON, General Manager, and Mr. FRED LACEY, Superintendent of the Montreal Cotton Company, the party will be shown the electric power plant and other objects of interest. The train will return leaving Valleyfield at 12.30 P. M. and reaching Montreal in time for lunch.

At 2.50 P. M. a trip by train to Lachine, thence down the Rapids, returning to the hotel for the fifth and concluding session at 5.00 P. M. The Local Committee are making further arrangements for the entertainment of the ladies of the party of which later notice will be given. At the sessions papers are expected on the following subjects:

Advantages of Coke over Coal as a Fuel for Generating Steam.
The Dederick Cotton Bale.
Cotton Ginning.
Economy of Using Turbines at Full Gate.
Eli Whitney and His Cotton Gin.
Export Trade.
Mechanical Stokers.
Oiling Fly Frame Spindles.
Description of the Electric Power Transmission Plant at Valleyfield.
Practical Results Obtained in the Drying of Textile Fabrics with the Assistance of a Vacuum.
Textile Education by Mail.
The Round Bale.
Various Systems of Computing Costs of Manufacture.
Valuation of Manufacturing Property for Taxation.
What Must be Done to Spin Fine Yarn on a Filling Frame.

In accordance with the vote at the last meeting of the Association, members will be requested to give receipts for whitewashing or equivalent finish for the interior of mills.

By order of the Board of Government,

C. J. H. WOODBURY,
*Secretary.*

The transportation to the meeting from Boston will be by special cars, or if a sufficient number attend, by special train, leaving Boston on the morning of Wednesday, October 4, from the Union Station at 9 A. M. and going to Montreal by way of Lowell, Manchester and Concord. Members will please address all communications relative to transportation to Messrs. Raymond & Whitcomb, 296 Washington Street, Boston, Mass., in accordance with the terms of their circular enclosed herewith. Many of the members will be accompanied by ladies.

Montreal is a city containing many points of great interest to the tourist, but detailed arrangements are not completed.

Candidates for membership are invited to the meeting as the guests of the Association, and it is hoped that the members will send the proposition for new members to the Association at as early a date as possible. Blank proposition may be found on the inside front cover of the Transactions, or will be sent on application.

Members who have overlooked their postal card receipt for Transactions are requested to give the matter attention, as it is only through this means that the headquarters of the Association are able to know that members receive the volumes and notices to which they are entitled.

It is the desire of the Board of Government that this meeting shall be one especially devoted to the discussion of the papers. With this object in view, it is hoped that members will carefully examine the list of papers, for the purpose of being prepared to add their contributions to the discussion.

Papers will be printed in advance for the use of members, as far as the manuscript may be sent to the Secretary in time, and copies will be sent to members on request, about a week before the meeting. Contributions of discussions in writing are solicited from members who will not be able to attend the meeting.

The SECRETARY. In accordance with Article 14 of the by-laws, I certify that this call was mailed to each member at least ten days before the meeting and that a quorum is now present. The following is the programme of the meeting.

## SEMI-ANNUAL MEETING, NO. 67, WINDSOR HOTEL, MONTREAL, P. Q., OCTOBER 5-6, 1899.

### PROGRAMME.

*First Session, Thursday, October 5, 1899, at 10 A. M.*

Call to Order.

Welcome to the Association.

HIS WORSHIP, RAYMOND PREFONTAINE, Q. C., M. P., Mayor of Montreal.

A. F. GAULT, Esq., President of the Montreal Cotton Company.

A. A. AYER, Esq., President of the Merchants Cotton Company.

President's Address.

FREDERICK E. CLARKE, Boston, Mass.

Export Trade.

D. A. TOMPKINS, Charlotte, N. C.

Valuation of Manufacturing Property for Taxation.

CHARLES T. MAIN, Boston, Mass.

Various Systems of Computing Costs of Manufacture.

JAMES G. HILL, Lowell, Mass.

TOPICAL QUESTIONS.

117. Can a systematic method of costs be determined for weaving?

118. In large manufacturing plants, having a number of rooms on each principal operation, which is the better, to have one overseer or department man in charge of each special operation, or to have a larger number of men in charge of smaller sections?

119. In which class of machinery, as at present running, is it desirable to improve the most to obtain a minimum cost in manufacturing?

Textile Education by Mail.

CHRISTOPHER P. BROOKS, New Bedford, Mass.

*Second Session, Thursday, October 5, 1899, at 4 P. M.*

Eli Whitney and His Cotton Gin.

M. F. FOSTER, Milford, N. H.

Cotton Ginning.

J. E. CHEESMAN, 27 William St., New York City.

The Round Bale.

LOUIS SIMPSON, Valleyfield, P. Q.

The Dederick Bale.

W. H. PERKINS, Boston, Mass.

TOPICAL QUESTIONS.

120. English practice has been in the direction of separating the business of spinning from that of weaving. What are the advantages of this separation? Is there any such tendency discernible in American practice at the present time?

121. What can be offered on the subject of the influence of moisture in the air affecting the strength of yarn?

122. What is the best temperature and humidity for good spinning on fine counts?

123. What is the best way to prevent double yarn on spinning frames where double boss rolls are used?

124. What is the best covering for the top rolls used on frames and mules that are to spin various numbers?

125. What is the best taper or length of wind for mule cops on number 37 filling?

At 2.30 P. M. carriages will leave the hotel for a drive around Mount Royal.

*Third Session, Thursday, October 5, 1899, at 8 P. M.*

Smoke Talk.

Montreal Temple Club, 807 Dorchester Street.

What Must be Done to Spin Fine Yarn on a Filling Frame.

ARTHUR H. GULLIVER, Ashton, R. I.

TOPICAL QUESTIONS.

126. Is it practical to spin numbers finer than 65s on larger rings than 1½ with spindle running 9,000 revolutions?

127. What is the maximum length to put No. 100s on bobbin?

128. How far is it practicable to substitute frames for mules in spinning filling?

Oiling Fly Frame Spindles.

RUSSELL W. EATON, Brunswick, Me.

TOPICAL QUESTION.

129. What means have been found useful in diminishing the number of oil stains?

Practical Results Obtained in the Drying of Textile Fabrics with the Assistance of a Vacuum.

CHARLES H. FISH, Dover, N. H.

TOPICAL QUESTIONS.

130. What steam pressure should be carried on slashers running on colored work, and what is the best means of returning to boilers the condensation from slashers?

131. What is the quantity of steam properly required for slashers and the best means of applying the same?

Description of the Electric Power Transmission Plant at Valleyfield.

J. J. ASHWORTH, Toronto, Ontario.

THURSDAY EVENING, Her Majesty's Theatre. The Alice Neilson Opera Company. Theatre Party for ladies and their escorts. Tickets will be furnished by the Local Committee until six o'clock P. M.

## *Fourth Session, Friday, October 6, 1899, at 9 A. M.*

Unless other arrangements interfere, at 9.00 A. M. a special train furnished by the courtesy of the General Electric Company of Schenectady, New York, and the Canadian General Electric Company, Limited, of Toronto, Ontario, will leave the Grand Trunk Railway Station for Valleyfield, where, as the guests of our members, Mr. LOUIS SIMPSON, General Manager, and Mr. FRED LACEY, Superintendent of the Montreal Cotton Company, the party will be shown the electric power plant and other objects of interest. The train will return leaving Valley-

field at 12.30 P. M. and reaching Montreal in time for lunch. Complimentary tickets may be obtained by members and guests from the Local Committee.

*Fifth Session, Friday, October 6, 1899, at 5 P. M.*

Economy of Using Turbines at Full Gate.

FRANK P. VOGL, Claremont, N. H.

TOPICAL QUESTIONS.

132. What is the best method of utilizing the waste products of a mill?

133. What is the best method of treating belts and their proper use?

Advantages of Coke over Coal as a Fuel for Generating Steam.

ARTHUR C. FREEMAN, Waltham, Mass.

Mechanical Stokers.

BYRON ELDRED, Boston, Mass.

TOPICAL QUESTIONS.

134. Is it advisable to warm picker rooms with air drawn from the main mill?

135. Are automatic heat regulators an advantage both in economy and comfort?

136. What is the best method of cleaning mill windows?

137. What methods have been successfully employed to diminish smoke from mill chimneys?

138. What is the best method of introducing kerosene oil into boilers, and what have been the results from its use?

139. Do water tube boilers contain advantages for steam plants in mills?

140. Do separators remove enough of the oil from condensed steam to prevent all injury to the boilers?

At 2.50 P. M. a trip by train from the Bonaventure Station to Lachine, thence down the Rapids, returning to the hotel in time for the after-

noon session. Complimentary tickets may be obtained by the members and guests from the Local Committee.

FRIDAY EVENING, the Academy of Music. Theatre party for ladies and their escorts to attend "The Sign of the Cross." Tickets will be furnished by the Local Committee until six o'clock P. M.

The Board of Government reserve the privilege of changing the programme if in their opinion the interests of the Association or local arrangements require modifications in the foregoing.

The Hosts of the Association at this meeting are:

The Canadian Colored Cotton Company, Ltd.
The Dominion Cotton Mills Company, Ltd.
The Merchants' Cotton Company.
The Montreal Cotton Company.

The Local Committee:

Messrs. ALFRED HAWKESWORTH, *Convener*, } of Montreal.
R. R. STEVENSON, }
FRED HAWKESWORTH, }
LOUIS SIMPSON, } of Valleyfield.
FRED LACEY, }

The PRESIDENT. I am glad, at the commencement of this meeting in this city of Montreal, to present to you His Worship Mr. PREFONTAINE, the Mayor of the city. [Applause.]

Mayor PREFONTAINE. Mr. Chairman, ladies and gentlemen, I have a most agreeable task to perform, both as Mayor of this city, and on behalf of the citizens of Montreal, in extending to you a most cordial welcome.

You have assembled here to hold the sixty-seventh annual meeting of your organization, and I can assure you that we are proud to have you in our midst.

Your Association, considered in its object, and in the results of its labors, and the vast enterprises which it represents, is of the utmost importance in this country.

During your stay in the city of Montreal, you propose to

discuss questions of great moment concerning the industry in which you are interested, and I know that practical results will be derived from your deliberations.

I am all the more happy at being called upon to address your Association today, because the cotton factories of New England provide employment for thousands of Canadian families. It is true that a very laudable effort is being made in order to prevail upon our people to return to Canada in as great a number as possible, to help us to build up a Canadian nation, but we cannot overlook the fact that the artisans of Canada who have gone to the United States to add to the strength, power and wealth of a foreign nation, are well looked after by our American cousins, and treated on every occasion as if they were their own.

I pray you, ladies and gentlemen, to consider yourselves at home in our city, the commercial metropolis of Canada, and I earnestly trust your meeting will prove fruitful, and will result in good to you as a body, and to the community at large.

You may rest assured that one and all the citizens of Montreal appreciate fully the honor you have done them in selecting their city for this your sixty-seventh semi-annual meeting, and whatever destiny may have in store for you, the good wishes of our people will always accompany you. [Applause.]

The PRESIDENT. I very gladly respond to the warm welcome of His Worship the Mayor of Montreal, and say to him that we, the New England Cotton Manufacturer's Association of Massachusetts, bring to him this morning our choicest greetings and our thanks for his hearty welcome.

Although chartered in the Commonwealth of Massachusetts at a place where the science and art of reeling and spinning cotton was early established, we have no limits to our membership, and having many from all parts of the States, we rejoice in having many throughout the Dominion of Canada, wherever the cotton interests are established.

The boundary, Sir, between the United States and Canada is a line extending across the continent from east to west, and the

same mutual interests exist in the cities and towns of both countries; firm business and individual friendships also exist and we behold the same characteristics for the establishment of manufactures throughout both countries. These factors make us, Sir, neighbors and not strangers. [Applause.]

We are together marching along the pathway of human progress, and while we admire and applaud the energy, and the skill of your people, which contributes to your wealth and to your prosperity, we also have a deep interest and pride in that interest which you show for the elevation of all classes in every condition of life. [Hear, hear.]

We shall be glad now to listen to Mr. A. F. GAULT, President of the Montreal Cotton Company.

Mr. A. F. GAULT. Mr. President, ladies and gentlemen, I have had a good many surprises in my time, but I think I never had a greater surprise than when this paper was put in my hand, and I saw that I was put down to make a speech. I can say to you now, gentlemen, that speech making is not my forte — I think I may be called a worker, rather than a speech-maker, as speech making has never come in my category.

However, I would be amiss in my duties if I did not say to you all, Mr. President, ladies and gentlemen, that on behalf of the companies which I represent, I give you a very cordial welcome to this city of Montreal, and we feel highly honored at seeing so many of the distinguished gentlemen from the United States who are working with us in the manufacture of the great staple called cotton.

We are yet in our infancy here, and have a great deal to learn, and I have no doubt that this meeting of the Association will stir up a great deal of interest among our managers, and those interested in the manufacture of cotton.

I am sorry I cannot speak as I feel. If I had the power, I should certainly enlarge upon the subject, but I shall have to ask you, Mr. President, to excuse me from making a speech. As I said before it is one of the things I am not good at. I can

only say we are delighted and pleased to see so many of you here in Montreal, and we hope you will go away feeling that you have enjoyed your visit, and that your visit to our good city will result in much pleasure to the members of the Association and that much good work will be accomplished through the numerous papers that will be read and from the discussion arising therefrom.

The PRESIDENT. I am pleased to present also Mr. A. A. AYER, President of the Merchants' Cotton Company.

Mr. A. A. AYER. Mr. President, ladies and gentlemen, I only wish to add my word of welcome to those who have favored our city with their presence on this occasion. I am sure it is a source of great gratification to all who are interested in the cotton industry in this country to be honored by your presence, and by your deliberations here. We have much to learn in this respect in this country. I was somewhat surprised and delighted at the same time, to learn that you had chosen this place for your meeting, for the cotton industry is so small here, compared with what it is in many of the cities and towns of the United States.

We are told that the man who causes two blades of grass to grow where only one grew before, is a benefactor to the human race. Well, I suppose it is equally true that he who causes two bolls of cotton to grow where only one grew before, is also a great benefactor to the human race — I believe, by the way, that somebody is at fault this year, and did not cause the two bolls to grow; we shall have to inquire into it. [Laughter.] If that is true, I think it is all the more true that he who takes those bolls of cotton and manipulates them and deals with them in the wonderful manner in which they are dealt with in the factory, and produces out of them all the varieties of cotton that are now produced — I say if it is true concerning the blade of grass, or the boll of cotton, I think it is far more true concerning the gentlemen who have the management of the cotton mills.

To my mind there is no more wonderful sight in the world, than going into a modern cotton factory and watching the machinery do its work. While I have no practical knowledge, and am only interested in one of the mills financially, still it is full of interest to me.

I repeat again, we welcome you to this city. I hope you will take the opportunity, a great many of you, to see the mill at Valleyfield tomorrow. I think that while we have but few mills in Canada that those of you who go there will find a mill which we have a right to be proud of in this country. If you choose to favor the mills nearer by, the Merchants' Cotton Company will be happy to see you.

By the way, that reminds me that I was asked the other day what I would say to a young man by way of advice. You know young men are generally told that the thing for them to do these days is to hustle and seize opportunities. I said, "I think in these days that a young man ought to *stop and think*." Now, it did strike me when you were coming to Montreal that you had chosen wisely in that respect, because, while you are very busy men at home probably your deliberations here, away from your cotton mills where you cannot take a little run out from Boston to your mill, but where you must be quiet, and think and act, may be for the best interests of the mills you are connected with.

May you do us good, and receive good yourselves. [Applause.]

## PRESIDENT'S ADDRESS.

FREDERICK E. CLARKE, Lawrence, Mass.

Gentlemen, Members of the New England Cotton Manufacturers' Association: Occupying for the first time in our semi-annual meeting the office to which you elected me last April, I desire to express my grateful appreciation of the honor conferred, and the confidence placed in me, in selecting me to preside over your sessions during the thirty-fifth year of the Association's existence. A member of the organization, from its first meeting in July, 1865, I well recollect its earlier meetings, held in a small room over the old Corner Book Store in Boston, and presided over by that broad minded man and manufacturer EZEKIEL A. STRAW, of Manchester, N. H., at one time Governor of the State.

I was a young man then, having taken upon myself the care and direction of a cotton mill, and while I learned much from the papers read and the able discussions which followed, I drew inspiration and encouragement which enabled me to solve many problems in my work.

Since that time I have been a close observer of the proceedings of the Association, and am therefore deeply sensible of the importance which attaches to its meetings, and of the extended influence it has exerted, and which it must continue to exert, in the promotion of knowledge affecting the interests and advancement of the cotton industry.

One cannot look through the records of our Transactions without being convinced, not only of the magnitude and diversity of our work, of the knowledge and wide scope of investiga-

tion shown in the many papers read, of the thorough familiarity displayed in the topical questions discussed, but also convinced of the great encouragement and stimulus its doings have given to improvement and perfection of method and machine in all branches of cotton manufacturing. There is not an avenue in the realms of science but may be explored with profit to the manufacturer, and while he labors industriously in his application of the laws of mechanics, of the results of investigations in science, and of the deductions from varied experience, he must also give his deep and earnest thoughts to the social, educational and moral welfare of his workpeople, that they too may have the upward impulse of improvement and maintain their superiority to the machines they watch over and direct.

From the time when PEARL and SAWYER first reduced the size and weight and increased the speed and production of the spindle, up to the present, there has been a steady advance all along the line. All through the long list of operations, from the opening of the cotton up to the last touch given to the finished goods for the market, improvements have been made in machinery and in treatment which have diminished the cost and enhanced the quality and value of the goods.

While yesterday the ring spindle seemed to have attained the highest perfection in the art of spinning cotton yarn, today we hear rumors of still greater improvements which if materialized will again revolutionize the spinning-room. The manufacturer himself or the manager at the mills, the supervisor of a department, the operative who tends the machine, as well as the inventor from the outside, are all keenly alive to the possibilities and desirabilities in the great field of machinery improvement, and each and all are striving towards better results in every process.

Constant progress has been the watchword of the last quarter of a century, and will lead in the next, so near at hand. Mr. DRAPER puts the Northrop loom, the latest production of his model shop, into your mill today and starts it with amazing success, but while this pattern, the product of many years of

hard work of the inventor, with the added talents of many mechanics, has been in course of construction, a new and better way has been devised to accomplish desired results or to overcome some slight defect obvious in your lot of looms. And you are told that in the next lot of looms built these defects will be remedied, and too late you regret that you had not waited before giving your order.

The difficulty, however, is inevitable. Evolution is constant in everything to which the mind devotes itself earnestly, honestly, and persistently — and each lot of looms turned out will naturally be superior in some respect to that which preceded it.

DANIEL WEBSTER told the young lawyer who said there was no room in the legal profession for a young man, that there was always room at the top. And while that is true it is also true that there *is* no *abiding* top.

The inventor who produced the intricate machine which revolutionized one of the great industries of the world, when he had finished it felt he had accomplished his purpose and attained perfection, but as he saw it working he discovered imperfection after imperfection, and the light faded from his eyes ere he could remodel his wonderful invention.

The quantity and quality of the fabrics produced have today reached their highest point in the history of the world, but the limit is not yet attained. The dawn of a new era in civilization is penetrating the superstition, ignorance and barbarism of some of the older nations, and awakening them to a consciousness of a better condition of life. New ideas, new habits, and new customs will follow, and as intelligence combined with industry multiplies the natural products of their soil, and promotes intercourse with other nations, the use of cotton fabrics will grow and create large demands in the producing districts of the world.

We hold today our first meeting outside the limits of the United States. We bring our warm greetings to the people of this beautiful city, and of the Dominion of Canada whose realms are subject to the flag of Great Britain — and we would pay our tribute of respect and honor to Her Gracious Majesty, Queen

Victoria, whose pure life, devotion and loyalty to the social, moral, and material interests of her subjects have enshrined her in their hearts and made her the model queen of history.

The wise, prudent, and comprehensive policy of her merchants and manufacturers has made her people foremost in the manufacturing industries, and built up the largest trade in cotton fabrics of any nation in the world. We have unbounded admiration for the energy, industry, and sagacity which have accomplished such wide and far-reaching results; and while we profit by their example we mark out our own course and governed by similar characteristics, we will continue to supply, to a large extent, our home markets, and open for ourselves new paths into the trade of the world.

Gentlemen, we come now to the legitimate business of the sixty-seventh meeting of the Association. The papers to be read treat of a wide range of subjects, and will doubtless provoke much discussion, add to our knowledge, and incite us to further investigation. The topical questions will engage your earnest attention, bring out the results of your experience, and add to the general interest. Throughout the entire meeting I hope there will be no hesitancy, but that with your accustomed zeal you will take part in the proceedings, and make our visit profitable and entertaining, and add much to our records, which are already of inestimable value to the seeker for information concerning the science and practice of cotton manufacture.

The SECRETARY. Your attention is called to some notices which pertain to your own interests during this meeting. Arrangements have been made on a very liberal scale by the local committee, and on account of the distance between Boston and Montreal, we were not at all times absolutely in touch with each other, largely because we did not know in Boston as to the number of the party that would be here, and there are numerous modifications in the arrangements, notice of which will always be

given in advance and this will be the only means by which information can be given to you of any changes or modifications, except from the desk.

First, the badges, which bear the United States and Dominion flags, will be given out by the young man at the door, who will register your names, whether members or guests. Those who have not received their badges will please apply to him at some time during the meeting. This afternoon the carriage ride around the mountain will be at 2.30, returning here in time for the afternoon session at four—that is, the afternoon session and the carriage ride will change places. As we have not a Joshua amongst us, it was thought better to take our ride when the sun was high. [Laughter.]

The carriages will be at the ladies' entrance and it will be assumed that those who are not there at 2.30 P. M. do not desire to go, and the local committee will of course, feel warranted in sending back any carriages which are not filled.

This evening there is also an embarrassment of the riches of hospitality. There has been a theatre party provided for by the local committee for ladies and their escorts, at Her Majesty's Theatre—the Alice Neilson Opera Company. I believe it is "The Singing Girl." At all events there will be a lot of singing girls there, and the tickets are distributed by a committee of all the ladies, namely, Mrs. JUSTIN A. WARE, Mrs. ARTHUR H. LOWE and Mrs. D. D. FELTON, from whom tickets for the ladies and their escorts may be obtained. After these tickets have been distributed, if there is any surplus they will be sent right back to the theatre, at five o'clock this afternoon.

The gentlemen of the party who do not have the privilege of escorting ladies to Her Majesty's Theatre, will receive consolation in the shape of a smoke talk at Montreal Temple Club, at 807 Dorchester street, about five minutes walk from the hotel, where the Association will hold their evening meeting. The first portion of the evening will be devoted to technical questions of great value, as will be seen by the programme. At 9.30, there will be some divertisements at the hands of the local com-

mittee who have not taken me into their confidence. If I knew, I would tell you what it is, but I don't know. [Laughter.]

Tomorrow morning we shall go to Valleyfield. The gentlemen will see the wheels go round in the power house, and a steam yacht will be provided to take the ladies of the party on the river, after which a light lunch will be served at the personal hospitality of Mr. LOUIS SIMPSON, and the gentlemen are going to lunch at a Club, always being under the very best guidance of our hosts, Messrs. SIMPSON and LACEY, who will see to it that the whole party are returned to Montreal in time for lunch. The afternoon of tomorrow, we will go down the Lachine Rapids. It will be necessary to leave about ten minutes before three, same Joshua reason as before. [Laughter.] Tomorrow night there will be a theatre party for ladies and gentlemen at the Academy of Music. The gentlemen can escort themselves if they have not any ladies to escort. These tickets are provided by the hospitality of the local committee. Any of our members or guests wearing badges can obtain them, and those who are entitled to wear badges can obtain the badges from the clerk when they register.

Export Trade by Mr. D. A. TOMPKINS of Charlotte, North Carolina, was read. Discussed by Mr. W. S. GRANGER.

The PRESIDENT. It is customary at this first meeting to elect the new active and associate members whose nominations have been seconded by some member and approved by the Board of Government during the last six months. I will appoint as a committee to distribute, collect and count the ballots Mr. EDWARD B. WILBUR, of Newberry, South Carolina, Mr. CHRISTOPHER P. BROOKS, of New Bedford, Mass., and Mr. GEORGE W. HOLT, of Putnam, Conn.

While the ballots are being passed, I desire to say that the George H. McFadden & Bros. Agency have kindly offered to give us the daily and almost hourly reports of the cotton market, which will be bulletined at the door so that each member interested may examine it.

Have all voted who wish? If so, I will declare the polls closed. The committee will report on the ballot at a future session.

The Valuation of Manufacturing Property for Taxation, by Mr. CHARLES T. MAIN, of Boston, was read in his absence by the Secretary, and discussed by Messrs. ARTHUR H. LOWE, CHARLES W. DENNETT, JOHN E. PREST, STEPHEN A. KNIGHT, WALTER E. PARKER, JAMES P. TOLMAN, JUSTIN A. WARE, GEORGE E. TUCKER, S. S. SPENCER and FREDERICK E. CLARKE.

The committee on the election of members reported: "We have attended to our duty and report that the following have received thirty-seven votes and no negatives."

EDWARD B. WILBUR,
CHRISTOPHER P. BROOKS, } *Committee.*
GEORGE W. HOLT,

FOR ACTIVE MEMBERSHIP.

EDWARD C. BEACH, Agt. Mass. Mills In Georgia, Lindale, Georgia.
By Mr. W. S. SOUTHWORTH.

JAMES C. CHALMERS, Vice-Pres. Renfrew Mfg. Co., Adams, Mass.
By Mr. JAMES RENFREW.

JAMES T. FERGUSON, Supt. Boott Mills, Lowell, Mass.
By Mr. N. B. KERR.

LOUIS B. GOODALL, Treas. Goodall Worsted Co., Sanford, Maine.
By Mr. C. J. H. WOODBURY.

S. GREENWOOD, Mgr. Canadian Colored Cotton Mills Co., Cornwall, Ontario.
By Mr. ALFRED HAWKESWORTH.

WILLIAM M. NIXON, Pres. Atlanta Woolen Mills, Atlanta, Ga.
By Mr. M. A. FURBUSH.

HERBERT W. OWEN, Asst. Supt. Merchants Mfg. Co., Fall River, Mass.
By Mr. J. E. OSBORN.

ALBERT R. PIERCE, Supt. Pierce Mfg. Corporation, New Bedford, Mass.
By Mr. JOHN T. MEATS.

J. F. POWERS, Supt. Eagle Mill, North Adams, Mass.
By Mr. THOMAS ARMSTRONG.

L. B. RENFREW, Asst. Mgr. Renfrew Mfg. Co., Adams, Mass.
By Mr. JAMES RENFREW.

HENRY B. SPRAGUE, Treas. Boston Woven Hose & Rubber Co., Cambridgeport, Mass.
By Mr. C. J. H. WOODBURY.

F. E. WATTLES, Agt. Boscawen Mills, Penacook, N. H.
By Mr. C. J. H. WOODBURY.

FOR ASSOCIATE MEMBERSHIP.

PERCY H. BRUNDAGE, Commission Merchant, 16 Greene St., New York.
By Mr. C. J. H. WOODBURY.

J. E. CHEESMAN, Gen. Mgr. Cheesman Cotton Gin Co., 27 William St., New York.
By Mr. C. J. H. WOODBURY.

C. C. COWAN, Pres. of Cotton Exchange, 316 Front St., Memphis, Tenn.
By Col. JEROME HILL.

SUMNER S. GOULD, Mgr. Lowell Branch American Card Clothing Co., Lowell, Mass.
By Mr. W. W. CAREY.

W. B. HAMMOND, Engineer A. A. Griffing Iron Co., 177 Fort Hill Sq., Boston, Mass.
By Mr. C. J. H. WOODBURY.

JOHN E. KENDRICK, Vice-Pres. American Supply Co., Providence, R .I.
By Mr. S. A. KNIGHT.

FRANK B. KENNEY, Kitson Machine Co., Lowell, Mass.
By Mr. H. C. PERHAM.

PELEG A. RHODES, Inspector of Cotton Mills, Providence, R. I.
By Mr. S. M. PITMAN.

JOHN E. SEARLES, Pres. American Cotton Co., 27 William St., N. Y.
By Mr. C. J. H. WOODBURY.

LETTICE R. WASHBURN, Mill Contractor, 235 North Water St., New Bedford, Mass.
By Mr. WILLIAM FIRTH.

The PRESIDENT. I declare the names as read by the Secretary to be elected to membership in the Association as specified.

The Various Systems of Computing Costs of Manufacture, by Mr. JAMES G. HILL, of Lowell, was read in his absence by Mr. GEORGE OTIS DRAPER.

Topical Question 117, Can a systematic method of costs be determined for weaving? was discussed by Messrs. ARTHUR H. LOWE and CHARLES W. DENNETT.

Topical Question 118, In large manufacturing plants, having a number of rooms on each principal operation, which is the better, to have one overseer or department man in charge of each special operation, or to have a larger number of men in charge of smaller sections? was discussed by Messrs. JOSEPH M. DUNHAM, CHARLES W. DENNETT, JOHN E. PREST, WALTER E. PARKER and FREDERICK E. CLARKE.

Topical Question 119, In which class of machinery, as at present running, is it desirable to improve the most to obtain a minimum cost in manufacturing, was discussed by Messrs. GEORGE O. DRAPER and JOSEPH M. DUNHAM.

Textile Education by Mail, by Mr. CHRISTOPHER P. BROOKS, of New Bedford, was read, and discussed by Messrs. ARTHUR H. GULLIVER, ARTHUR H. LOWE and CHRISTOPHER P. BROOKS.

Mr. CHRISTOPHER P. BROOKS. There is another matter that has been brought to my attention in connection with the Paris Exposition to be held next year. A number of conferences are being arranged in Paris, and on going over the list, I have only noticed two that would be of interest to this Association, one the International Congress of Technical Education, and another the International Congress on Yarn Numbering, of which the Secretary is Monsieur P. FLEURY, 9 Rue d'Uzes, Paris. The Secretary of the Massachusetts State Commission to the Paris Exposition has drawn my attention to this conference on Yarn Numbering and has sent me a communication from the officials who are organizing these conferences in Paris with a request

that I would obtain some information, and the views of the manufacturers and members of this Association with regard to it.

The conference on yarn numbering is being organized by French manufacturers. Of course as members of this Association know, in the cotton trade we have a system of numbering yarn which is comparatively common to all English speaking countries, that is, on the basis of 840 yards to the hank, and the number of hanks to the pound gives the number of the yarn. This is not so in Europe. There are other systems in use in France, Germany and Switzerland which vary from this.

In woolen threads a very wide variety exists in this country. We have two or three systems for numbering woolen yarns, the run system and the cut system, and in some districts other systems differing from the run and cut system. In England there are a dozen different methods of numbering woolen yarns in different districts, and they have still more methods in use on the continent of Europe.

Jute again, is numbered by a different method. Linen is numbered by two or three different systems, likewise silk, so that you see there is quite a number of systems, which lead to complication in building machinery, in arranging reeling machinery and measuring machines and which cause considerable difficulty in international trading. The buyer in one country may have a different system of measuring or numbering yarns from the seller in another country, and it is the intention of this Congress to recommend to the manufacturers and machine builders of the world one system that shall be adopted by all manufacturers.

I will not read the lengthy report I have referred to, but will just mention two paragraphs.

The first paragraph states that "On account of the international importance to the textile industry of the questions to be discussed by the Congress of Thread Numbering of 1900, the organizing committee has addressed a special circular to French manufacturers to explain the present state of the case."

The other paragraph I wish to call your attention to is as

follows: "According to this, all the difficulties result either from local uses which have no appreciable effect beyond a limited circle, or different systems of weights and measures, which re-act from nation to nation on commercial relations."

The report ends by making an appeal to manufacturers to give their opinions, and have some one to represent these opinions so that a system can be adoped or recommended which will be satisfactory all around.

I mention this matter simply to suggest whether this Association will be ready to express an opinion on the subject and transmit it in suitable form to the Conference.

This Association is almost unique among manufacturers. Personally I don't know of any other association of textile manufacturers which has for its object social meetings and discussions of questions of interest to the manufacturer, with the exception of a small association in Alsace in Germany. There are plenty of associations in Europe which have for their object the regulation of wages, etc., but this is a unique association of textile manufacturers who meet to discuss questions of this kind—questions of interest to the manufacturers, and generally arriving at decisions in connection with it, and I have no doubt that the opinion of this Association will have considerable weight with the conference which will be held in Paris next year.

Mr. N. B. KERR. Mr. President, I move that this matter of standard yarns be referred to a committee of three, with instructions to report at the next meeting of the Association.

Mr. ARTHUR H. LOWE. I second the motion.

The PRESIDENT. You hear the motion, gentlemen, that this matter be referred to a committee of three—how shall it be raised, Mr. KERR?

Mr. N. B. KERR. To be appointed by the President.

The PRESIDENT. You have heard the motion gentlemen. Will those in favor of this motion signify in the usual manner.

Mr. ARTHUR H. LOWE. Mr. President, I move in amendment that a report be made at this session of the meeting, so that it might be left in some definite form rather than waiting till next April, as that would be rather late.

The PRESIDENT. Mr. BROOKS, how is that matter? The Exposition is not to be held till a year from this fall?

Mr. CHRISTOPHER P. BROOKS. The Exposition will be from May to October of next year. I think it will be better to decide at this meeting.

Mr. JOSEPH M. DUNHHAM. I would just say one word, that is, that it seems from his report that the cotton is numbered alike all around.

Mr. CHRISTOPHER P. BROOKS. No, the French and German have a different system for cotton.

Mr. JOSEPH M. DUNHAM. It seems to me it would be well, certainly, that the cotton should be numbered alike all over the world, but I don't see what we have to do with silk, or jute or any of the others.

Mr. ARTHUR H. LOWE. Some of us are interested in silk and linen, and we would like to have the whole thing uniform.

Mr. NATHANIEL B. KERR. I think the concensus of this meeting is that we should make a recommendation in the matter.

The PRESIDENT. Are you ready for the question? All those in favor please say Aye.

It is a unanimous vote.

I will name Mr. NATHANIEL B. KERR, Mr. ARTHUR H. LOWE and Mr. CHRISTOPHER P. BROOKS as a committee to act in this matter.

## SECOND SESSION.

THURSDAY, OCTOBER 5, 1899.

---

Meeting called to order by the Secretary in the absence of the President, at 4 P. M.

At the motion of Col. JEROME HILL, Mr. STEPHEN A. KNIGHT took the chair *pro tem.*

The following papers were read:

Eli Whitney and His Cotton Gin.

M. F. FOSTER, Milford, N. H.

Cotton Ginning.

J. E. CHEESMAN, New York, N. Y.

Discussed by Messrs. ARTHUR H. LOWE, LOUIS SIMPSON, STEPHEN A. KNIGHT, J. E. CHEESMAN and JOHN E. PREST.

The Round Bale.

LOUIS SIMPSON, Valleyfield, P. Q.

Discussed by Mr. JEROME HILL.

The Dederick Bale.

W. H. PERKINS, Boston, Mass.

Discussed by Messrs. STEPHEN A. KNIGHT, JEROME HILL, LOUIS SIMPSON, JOSEPH M. DUNHAM, FREDERICK E. CLARKE and JOHN E. PREST.

TOPICAL QUESTIONS.

120. English practice has been in the direction of separating the business of spinning from that of weaving. What are the advantages of this separation? Is there any such tendency discernible in American practice at the present time?

No discussion.

121. What can be offered on the subject of the influence of moisture in the air affecting the strength of yarn?

No discussion.

122. What is the best temperature and humidity for good spinning on fine counts?

No discussion.

123. What is the best way to prevent double yarn on spinning frames where double boss rolls are used?

No discussion.

124. What is the best covering for the top rolls used on frames and mules that are to spin various numbers?

No discussion.

125. What is the best taper or length of wind for mule cops on number 37 filling?

No discussion.

# THIRD SESSION.

TEMPLE CLUB, DORCHESTER ST., THURSDAY, OCT. 5, 1899.

---

Meeting called to order at 8 P. M., President CLARKE in the chair.

The following papers were read:

What Must Be Done to Spin Fine Yarn on a Filling Frame.

ARTHUR H. GULLIVER, Ashton, R. I.

Written discussion by Mr. JOHN T. MEATS, read in his absence by the Secretary.

TOPICAL QUESTIONS.

126. Is it practical to spin numbers finer than 65s on larger rings than 1½ with spindle running 9,000 revolutions?

No discussion.

127. What is the maximum length to put No. 100s on bobbin?

No discussion.

128. How far is it practicable to substitute frames for mules in spinning filling?

No discussion.

Oiling Fly Frame Spindles.

RUSSELL W. EATON, Brunswick, Me.

Read by the Secretary in the absence of the author.

TOPICAL QUESTION.

129. What means have been found useful in diminishing the number of oil stains?

No discussion.

Practical Results Obtained in the Drying of Textile Fabrics With the Assistance of a Vacuum.

CHARLES H. FISH, Dover, N. H.

Read by the Secretary in the absence of the author.

TOPICAL QUESTIONS.

130. What steam pressure should be carried on slashers running on colored work, and what is the best means of returning to boilers the condensation from slashers?

No discussion.

131. What is the quantity of steam properly required for slashers and the best means of applying the same?

No discussion.

Description of the Electric Power Transmission Plant at Valleyfield.

J. J. ASHWORTH, Toronto, Ontario.

Discussed by Messrs. GEORGE F. STEELE and FRED LACEY.

The remainder of the evening was given to informal conversation and the enjoyment of the hospitalities of the club, at which the following programme was presented:

PROGRAMME.

| | |
|---|---|
| SELECTION, | Orchestra |
| SELECTION, | Orpheus Vocal Quartette |
| PIANO SOLO, | Mr. John Raper |
| COMIC SONG, | Mr. George Grant |
| SCOTCH DANCES, (accompanied by bagpipes) | Messrs. Fraser and McGinnis. |

| | |
|---|---|
| BASS SOLO, | Mr. Ed. Quinn |
| SELECTION, | Orchestra |
| RECITATION, | Mr. Giles |
| RECITATION, | Mr. McLaughlin |
| SWORD DANCE, | Mr. Fraser |
| BARITONE SOLO, | Mr. Mullarkey |
| VIOLIN SOLO, | Mr. Silverstone |
| CAKE WALK, | Mr. Weeks |
| TENOR SOLO, | Mr. Bartholomew |

## FOURTH SESSION.

FRIDAY, OCTOBER 6, 1899, AT 9 A. M.

---

This session was devoted to a trip to Valleyfield.

---

## FIFTH SESSION.

WINDSOR HOTEL, MONTREAL, FRIDAY, OCTOBER 6, 1899.

---

Meeting called to order at 5 P. M., President CLARKE in the chair.

The following papers and topical questions were read by title:

Economy of Using Turbines at Full Gate.

FRANK P. VOGL, Claremont, N. H.

Discussed by Col. SAMUEL WEBBER.

TOPICAL QUESTIONS.

132. What is the best method of utilizing the waste products of a mill?

No discussion.

133. What is the best method of treating belts and their proper use?

No discussion.

Advantages of Coke over Coal as a Fuel for Generating Steam.

ARTHUR C. FREEMAN, Waltham, Mass.

Mechanical Stokers.

BYRON ELDRED, Boston, Mass.

TOPICAL QUESTIONS.

134. Is it advisable to warm picker rooms with air drawn from the main mill?

No discussion.

135. Are automatic heat regulators an advantage both in economy and comfort?

No discussion.

136. What is the best method of cleaning mill windows?

No discussion.

137. What methods have been successfully employed to diminish smoke from mill chimneys?

Discussed by Mr. OSCAR ELSAS.

138. What is the best method of introducing kerosene oil into boilers, and what have been the results from its use?

No discussion.

139. Do water tube boilers contain advantages for steam plants in mills?

No discussion.

140. Do separators remove enough of the oil from condensed steam to prevent all injury to the boilers?

No discussion.

The PRESIDENT. It remains for us to express our thanks and our appreciation of the hospitalities which have been showered upon us by the people of Montreal. We all understood, and expected, and knew that there was much generosity here, but we did not anticipate so much as we have received, and as we go away, we shall consider these two days always as red letter days in our memory, and down deep in our hearts we shall have the warmest wishes for the continued health, prosperity and happiness of our friends in Montreal, and in the Dominion of Canada. [Applause.]

I shall be glad to hear from any members of the Association.

Mr. ARTHUR H. LOWE. Mr. President, it gives me a great deal of pleasure to rise at this time, and I am only sorry that words so inadequately express the feelings of my heart, as I know it will the feelings of all who are here, but I move, sir, a hearty vote of thanks be extended to our hosts, the Canadian Colored Cotton Mills Company, the Dominion Cotton Company, The Merchants' Cotton Company and the Montreal Cotton Company, first for the invitation to hold this meeting in this historic and interesting city, and for the warm and sincere welcome that we have received at their hands, for the convenient arrangements made for the holding of our meetings, and for the royal and generous entertainment that we have so thoroughly enjoyed.

I also extend the thanks of our guests and ladies' who are unanimously enthusiastic in their expressions of appreciation for the delightful programme arranged for their pleasure, and I suggest, sir, that a copy of appropriate resolutions be sent to each one of those our hosts.

The PRESIDENT. The adoption of these resolutions, with the accompanying motion is before you, and it is for you the members and guests, and ladies and gentlemen to vote upon it, and I would ask you all to rise in voting upon it, and I will take the expressing of the meeting now.

The motion was unimously carried by a rising vote, with three hearty cheers for our hosts.

Mr. JUSTIN A. WARE. I rise to offer this resolution: It is a special one referring to the local committee.

*Resolved*, that the New England Cotton Manufacturers' Association and their guests extend their sincerest thanks and appreciation to the local committee for the very attractive, enjoyable and satisfactory manner in which they have planned and executed for our constant entertainment.

The PRESIDENT. You hear the resolution offered by Mr. WARE, and I will ask you now to vote upon that by a rising vote. All those in favor please rise.

The resolution was carried unanimously by a rising vote.

Mr. D. A. TOMPKINS. Mr. President, I wish to offer the following resolution:

*Resolved*, that the Secretary be instructed to communicate to Mr. A. F. GAULT, President of the Montreal Cotton Company, the appreciation of the Association of the welcome extended to it, as expressed in his address of welcome at our first meeting in Montreal.

Also, *Resolved*, that the Secretary be instructed to communicate to Mr. A. A. AYER the thanks of the Association for the friendly welcome extended to us in his address of welcome at our first meeting in Montreal.

Also, that the Secretary be instructed to communicate with Mr. LOUIS SIMPSON and Mr. FRED LACEY, and extend to them our appreciation of hospitalities the members have received at their hands.

The PRESIDENT. You hear these resolutions offered by Mr. TOMPKINS, of North Carolina. All those in favor please rise.

Carried unanimously by a rising vote.

Mr. S. S. SPENCER. Mr. President, I wish to offer the following resolution:

*Resolved*, that the thanks of the Association are due to Messrs. George H. McFadden and Brothers for furnishing us with cotton quotations during our meetings, and that the Secretary be directed to convey them to them.

The PRESIDENT. You hear the resolution offered by Mr. SPENCER. All those in favor will please rise.

Resolution unanimously carried by a rising vote.

Mr. NATHANIEL B. KERR. Mr. President, I presume it is important that as little unfinished business as possible should be left over until the next meeting and so the committee on yarn numbering wish to make the following report, if it is in order.

The PRESIDENT. It is in order. I was just about to call for it.

Mr. NATHANIEL B. KERR. The committee to whom was referred the subject of yarn numbering beg leave to offer the following:

*Resolved*, that the New England Cotton Manufacturers' Associations learns with interest that a conference is to be held in Paris in 1900 with a view to the unification of yarn numbering.

*Resolved*, that the object of the conference is heartily approved, and that this Association recommends the adoption of a single standard to indicate yarns and threads of all materials, more especially those made of cotton.

*Resolved*, that the President and Secretary of this Association be authorized to communicate these resolutions to the Secretary of the conference.

Mr. WALTER E. PARKER. I have much pleasure in seconding these resolutions.

The PRESIDENT. All in favor of the motion will please signify in the usual manner.

Resolutions carried unanimously.

Mr. CHARLES H. RICHARDSON. I move that the thanks of the Association be extended to the General Electric Company of Schnectady, New York, and to the Canadian General Electric Company, Limited, of Toronto, Canada, for the courtesies extended to the Association this afternoon, the arrangements for which were so fully carried out by Mr. BUSH and Mr. STEELE.

The PRESIDENT. You have heard the motion. All in favor will please rise.

Motion was carried unanimously.

Mr. JOSEPH M. DUNHAM. Mr. President, I move that this Association extend thanks to His Worship the Mayor of Montreal, for his kind greetings, and for the welcome he extended to us in his address to this beautiful city of Montreal.

The PRESIDENT. You have heard the motion of Mr. DUNHAM of Springfield. All in favor of that motion of thanks to His Worship the Mayor of Montreal will please rise.

Motion carried unanimously by rising vote.

Mr. THOMAS G. COX. I move that we extend a vote of thanks to Mr. W. H. PERKINS, Mr. BYRON ELDRED and Mr. J. J. ASHWORTH, gentlemen who are not members of the Association, for their contribution of papers to this meeting.

The PRESIDENT. All in favor of this motion will please say aye.

The motion was put and carried unanimously.

The PRESIDENT. I congratulate you, gentlemen, upon the success of our meeting, and extend to you my warmest hopes for your continued health, and hope that we shall meet together in April next with renewed zeal in the interest of our Association.

I declare this meeting closed.

Adjourned.

Attest:

C. J. H. WOODBURY,

*Secretary.*

# TRANSACTIONS.

## FIRST SESSION.

THURSDAY MORNING, OCTOBER 5, 1899.

The Association met in the hall of the Windsor Hotel at 10 A. M., President FREDERICK E. CLARKE in the chair.

The PRESIDENT. The first paper to be read today is on "Export Trade" by Mr. D. A. TOMPKINS, of Charlotte, North Carolina.

## EXPORT TRADE.

D. A. TOMPKINS, Charlotte, North Carolina.

As members of the New England Cotton Manufacturers' Association we meet together for our mutual advantage. Mr. AYER in his remarks of welcome to us has expressed his conviction or apprehension that the cotton crop of the American cotton growing states is going to be very short. It might not be amiss, in coming from the cotton growing region, to say a word of caution to my fellow spinners further north. The season is not yet over. The cotton is still whitening under the shining sun at the South. Some of you may yet be surprised at the size of the crop.

The President of this Association in his remarks said that this is the first time we ever held a meeting outside the United States. I am disposed to congratulate the Association that we should have gotten beyond the borders of our own country—expanded as it were. Permit me, however, to call attention to the fact that we are not outside the spinning area of America. Here in America our manufacturing interests have grown until we now make more goods than our domestic markets will take. I feel that it is a good thing for us to get together, extend our acquaintance with each other and begin to study ways and means of finding markets outside of America for our increasing production of goods.

### OUR HOME CONDITION.

The American cotton manufacturing interest is all practically confined to the Atlantic coast territory. This includes the

Canadian interests as well as those of the United States. On many other questions we have been led to consider ourselves widely separated territorially and on account of these we have fallen into much error of thought as to our relations.

The spinners and weavers of America are really all neighbors and it is gratifying that we are beginning to make visits to each other in a neighborly way. The trip of this Association to Charlotte and Atlanta did much to bring about better feeling and better understanding. In the one to Philadelphia the New England spinner and the Southern spinner both lost some conceit and learned that the Quakers and their friends knew better than either of us how to spin, weave and be hospitable.

In coming here to Montreal we again learn — all of us, Philadelphia included, that "there are others". Observing the liberal hospitality of these Canadians I am sure they will feel better satisfied with themselves for this conduct after we have gone and I hope they will also think better of us.

But reverting to the original thought, we are neighbors — neighbors who have common interests—and we ought to meet oftener in social and commercial intercourse for our pleasure and for our common commercial advantage.

The old idea that it is a long way from Boston to Charlotte is slowly but surely dying away. Our ancestors of Revolutionary times never had the idea even in times when the trip had to be made by private conveyance or sailing vessels. It is an idea that came of differences about slavery, and while the idea still remains in many minds there are many who know that the fact is different.

A very few years ago I was in Boston while some labor bill was under discussion in the Legislature. A committee of gentlemen from Fall River who were in Boston to appear before the special legislative committee asked me to go with them to the State House to verify some statements they had made about Southern mills.

"I can't do that," I answered, "but if one or all of you gentlemen will go home with me to Charlotte I will see that you get

ample opportunity to see the mills there, twelve in number, and you can then return and speak for yourselves."

"Oh, that would take too long," one of the committee said.

"How long?" I asked.

"Two or three weeks," was the answer.

"There you are in error and it is an error I particularly want to correct," I said; "you leave New York city at 4.30 P. M. Next morning you are in Charlotte for breakfast. You can see 12 cotton mills during the day of your arrival. You leave Charlotte after tea at 8.30. Next day about noon you arrive in New York, and in the evening in Boston.

"Leaving Boston Wednesday forenoon you can go to Charlotte, see 12 cotton mills Thursday and have all day to do it; returning you can get home Friday evening and on Saturday testify before the committee here and of your own knowledge."

"Ned, would you have believed that?" asked one of the Fall River men to another.

"I don't believe it," said Ned, "and I'll tell you why. Some 30 years ago I started South, say to Charlotte or any other point. I was backed by the entire resources of the United States Government. My party consisted first and last of something like two and a half million men. I crossed the Potomac 14 times, the Rappahannock 184 times. I walked 27,247 miles. I was four years on the way. I got shot four times, and I never got there. I hope I will be excused for not believing that anybody can make that trip over night. It can't be true." [Laughter.]

It is true, however, and in spite of nervous prejudices we are neighbors, people of common blood and having common interests. We ought to be neighborly, meet oftener and instead of controverting our local markets, study together and promote our common interests.

What's the use of our squabbling over half a loaf and calling each other names when there is a whole loaf and to spare for each of us if we will stop squabbling long enough to see it.

I heard a little girl complaining a few days ago to her father that some one had called her a "kid".

"Well, what difference does it make. I expect he liked you and wanted to call you a pet name," said the father.

"If I was a boy it might be all right," said the little demoiselle, "but I'm a girl and I won't be called a kid by anybody."

"Oh, fuss and feathers," said her father, "everybody calls children kids and by that rule you are a kid."

"If I'm a kid" said the little lady with asperity, "you must be an old billy goat." [Laughter.]

That concluded the argument, and so it is with the spinners and weavers of America, Canadian, Puritan, Quaker or Cavalier, fish, flesh or fowl, we are all of a kind. It behooves us to get together.

I might tell you another story of common interests and common faults. An industrious and fairly worthy man went to a barbecue down in our country. He got into a controversy with his own son who knocked him down. "Sammy, my son, I'm sorry to say it but any man who would hit his own father must come from mighty poor stock, mighty poor stock, Sammy." [Laughter.] When the people of the North and South say ugly things of each other its more or less of a case of a son's knocking the father down. We are all of the same flesh and blood, and what you fellows in Massachusetts say about us in North Carolina applies to you about as well. If we were not in Canada—out visiting as it were—I would say that I expect the most of what you've said about us is tolerably near correct. [Renewed laughter.]

But more seriously we must work together and in harmony look after American trade. When I say this I include Canada. We want to work in harmony with American Canada and with the great nation of the world, Anglo-Saxon England.

Why controvert and fight for American trade only when the trade of the world is open to us if we will only reach out for it.

I was told a few days ago of a man who was traveling on a Mississippi steamboat. He was at a point where the banks of

the river were a mile or more in either direction and things looked as if the river might be a mile deep. The man fell overboard. He was floundering and was about to drown. "Stand up," "Stand up," "Stand up," the pilot keep shouting. Finally the man heard and, standing up, found that the water was only knee deep.

In 1893 when we were all in trouble if we had had our wits about us and stood up we would have found the water to be knee deep only.

In illustration of this I give the following tables to show how exports have helped us out of the panic of 1893.

EXPORTS PRODUCTS IRON FROM UNITED STATES.

| | |
|---|---|
| 1894, | $29,220,264 |
| 1899, | 93,715,951 |

IMPORTS.

| | |
|---|---|
| 1891, | $53,544,372 |
| 1899, | 12,098,239 |

Agricultural exports ranged from 1892 to 1899 about $650,000,000.

EXPORTS MANUFACTURED PRODUCTS AS FOLLOWS.

| | |
|---|---|
| 1892, | $158,000,000 |
| 1896, | 228,000,000 |
| 1898, | 290,000,000 |
| 1899, | 338,000,000 |

It is thought that at the end of the present fiscal year the figures will reach $350,000,000. [Applause.]

OUR OBLIGATIONS ABROAD.

Time brings every young thing to maturity. When the period of maturity is reached, youth must abandon the rules that obtained at an earlier period and adopt those necessary to carry on the larger work that always presents itself to maturity.

In the days of WASHINGTON or HAMILTON the domestic trade of the United States was all the trade she had. She did not send abroad anything worth the while. HAMILTON wisely, therefore, inaugurated a system of protective tariffs, which to some extent, has been in force throughout all the years of the national life of the Republic.

As long as our home trade was worth more than our export trade, as long as our manufacturers did not wholly supply the home market, there could be no doubt as to the correctness of such a system of taxation as a tariff for protection. And this doctrine was advocated by such men as CLAY, ADAMS, WEBSTER, CALHOUN and a host of lesser statesmen, at various times. Those men were right.

But in the development of the nation, the United States has come to the period of its life when it must recognize changed conditions. The United States cannot stand still; she cannot go backward. Under the protective system she has developed her manufacturing interests to such an extent that her domestic market now no longer absorbs her manufactured products. The cotton factories of America now make enough goods in eight months to meet all local orders. The question with America now is, what shall be done with the output of the mills for the other four months?

Under adverse conditions the United States has lately developed a considerable export trade. In the last ten years, from 1887 to 1897, the trade of the United States with China in cotton yarns and cotton goods increased 121 per cent. in quantity and 59½ per cent. in value, the value of such trade in 1887 being $5,331,251 and $8,500,802 in 1897. If we can continue to extend this trade, we can build more cotton mills in the United States. If we lose this trade with China in the East, the United States already has too many mills. It seems to me, therefore, that the most vital question which concerns the cotton milling industry in America lies along the line of the Republic making sure of its export trade. [Applause.] This is the kind of protection the States now need, and especially the Southern States

where there is at present the greatest activity in the cotton industry.

But I said that what export trade the United States has built up with the East has been built up under adverse conditions. We have no cable across the Pacific; we have failed to build as yet, the Nicaragua Canal; we have failed to foster by subsidies larger, better, or faster steamers for carrying the Pacific mails; we have failed to establish American banks in Yokohama, Shanghai, Hong Kong and Manila, having connections with the great American banks on this side the Pacific; we have failed to put on exhibition at some central point like Shanghai a first class exhibit of American goods; we have failed to ascertain thoroughly what classes of goods the East needs and prepare to make them; we have failed to perfect our Consular service by putting it wholly under civil service regulations; we have failed, so far, to co-operate heartily with Great Britain in maintaining the "open door" in China and in resisting the movement for the partition there; and lastly, we have failed to realize the supreme importance of retaining the Philippine Islands and entering fully on the work of a civilizing world power, conscious of its large mission.

It is not for the United States to determine the question of expansion, or what the politicians call imperialism. The onward march of civilization, which no nation can retard, is solving that question. The United States must make progress or go to the rear. The march of civilization determined the fate of the American Indian. Sentiment may excuse that civilization in vain, for civilization will repeat that kind of work every time an opportunity offers. Men tried to perpetuate human slavery in the face of that civilization, but they failed. The Philippines must bow to the march of progress or perish from the earth. If the United States is not the agent of civilization in the East, some other nation will be, after we make it plain that we intend to avoid the larger responsibilities of maturity. The United States, therefore, should retain Cuba, Porto Rico and the Philip-

pines. [Applause.] And there is no section of the Republic more interested in this policy than the Southern States.

The commanding position which the United States has lately assumed ought to emphasize the necessity of directing attention to that larger protection which the expansion of our export trade will secure. [Applause.] The United States now has the best domestic transportation facilities of any country in the world; wealth or capability considered she has the worst ocean transportation facilities. We travel on our own railroads and prosper at home. We travel in British and German ships and do not prosper abroad. The United States ought to sail the seas in her own ships under her own flag, and carry her own goods to China and the East in her own bottoms. [Applause.] There is hardly a town or city or county in the United States which has not voted money to build railroads, to promote local transportation facilities. And while this has been done by hard headed business men everywhere in the states, these same men hold up their hands in horror at the suggestion of a subsidy for a steamship line, and herein the American policy has been less wise or sensible than that of England. Only recently the British Parliament by a vote of 223 to 101 passed a resolution authorizing the issue of £865,000 of government guaranteed bonds with which to enable the Jamaica Fruit and Produce Association to establish a line of fruit and passenger steamers between Kingston and Great Britain; besides thus guaranteeing the bonds of this company Parliament resolved to grant the company a subsidy of £10,000 a year for five years. This is only one instance of how Britain has promoted all kinds of industries in her dominions. It is said, too, that as soon as this company becomes established that it will extend its trade to the United States and to Canada. I favor, therefore, subsidies to improve the shipping interests of the United States, as well as the reorganization of our Consular service on a commercial and not a political basis. [Applause.] As our Consular system now obtains, we send men abroad for a year or two; about the time they learn the language and the trade conditions of the country to which

they are sent they are recalled and others are sent to do the same things, while the merchants and manufacturers at home sell very little more goods abroad than before.

And there is another question which concerns the United States vitally, as well as it concerns our British friends. I refer to the question of what shall be done with China. In the so-called breaking up of that vast Empire the United States, and especially the South, has great concern. I quote from a recent speech of Hon. JOHN BARRETT, our ex-minister to Siam. He says:

"The South has such a particular interest in the development of our Asiatic markets, that there should be widespread interest in the Pacific opportunity from the Roanoke to the Rio Grande. The developing demand, both for raw cotton and for manufactured cotton from the South, is one of the most interesting features of Oriental trade. The raw cotton which the South is sending to Japan, and which she may send to other ports in China, is only a slight measure of what may be sent in the future. The far East wants it, must have it, and if the South has it to spare, she will ultimately find in the Orient a great outlet for her surplus product. At the same time it is remarkable that among the most popular manufactured cotton products in China today are those which come from the Southern mills. The demand for this line of goods is already large, but the best judges of Asiatic trade say that there is no reason why it should not reach into scores of millions.

"The particular market for these Southern mills is Manchuria, as I have elsewhere intimated, and, therefore, they have a special concern in seeing that Manchuria is never closed to them. Not more than one-thirtieth of the population of Northern China has yet been reached in this market. If the entire field shall ever be covered, it will require all the cotton mills in the South to supply the demand. If there is a market there which presents the astonishing condition of demanding in large quantities both raw and manufactured cotton from the same section, without conflicting or competing with each other, certainly the South

should do all in its power to hold and protect it. It is a conservative estimate to say that the Southern States should within the next 15 years, do a business of $25,000,000 per annum in cotton, if the markets of China are not closed against them.

"The cotton manufacturers of the South, for instance, have millions of invested capital practically dependent upon the markets of Manchuria being kept open. At the present moment we have nothing but a treaty with a power that is breaking up to protect such vested interests. We have no understanding with Russia, and Manchuria is practically Russian. I hope Russia will forever maintain the open door, but we have no positive assurance that she will."

The question how to act and what to do in the East, then, are vital questions. By dividing up China into "spheres of influence" the first step towards the dismemberment of the Empire has already taken place. At present, or as long as these spheres of influence are permitted by the great powers of the earth, the United States is reduced notwithstanding its treaty agreement with China, to deal with China not as a unit but with fragments under other flags, in case we desire to get any permanent guarantees for the protection of our trade. This state of affairs must appear to everyone as a very unsatisfactory way to deal with China. It must also be equally clear that unless we soon take steps to maintain permanently our trade in Manchuria or other Chinese states, we shall see the day when that trade will be annihilated. The time is rapidly coming unless there is a change of policy, when Russia will be strong enough to show us the door out of Manchuria instead of keeping the door open.

These conditions indicate that our policy should be to adhere firmly to the policy of the open door, an equal opportunity aiding in reviving the imperial authority of China by injecting stimulants if need be. To maintain this policy Great Britain, the United States, and Japan should work in harmony, for these nations are all interested in an open door [applause] and the policy of equal opportunity. [Renewed applause.]

Unless these interests in China are secured by more definite

engagements on the part of our State Department at Washington it is difficult to see how our export trade has much guarantee for future expansion in the East, and especially in Manchuria where the South is most vitally interested. Failure in this respect on the part of our State Department may not result in disaster to the present administration, but it is safe to say that posterity will never forgive it for inactivity in so important a matter and in the face of so many warnings.

If, then, we would be wise for the future, if we would make it impossible to overdo the cotton industry in the United States and in the South, we should take the most intelligent interest in adjusting the Eastern question so that our export markets will not suffer in the days to come. [Applause.]

A wounded soldier was taken at Santiago to the battlefield hospital. A nurse started in to get him into shape. "I'm going to wash your face," she said.

"But I don't want my face washed," he insisted.

"Oh, but we must wash your face and fix you up," she said, "all the other wounded soldiers are having their faces washed."

"Oh, well," said the soldier, "if the other fellows are having their faces washed you can wash mine also. I'm going to stay right with our fellows."

So with me, Mr. President. Competition in trade has become a world competition. It is a competition of nations and races. I want to stay with, and co-operate with, my people—the Anglo-Saxon race. [Applause.]

The PRESIDENT. We have listened to the very interesting remarks this morning of Mr. TOMPKINS upon topics which are very near to our hearts. We shall be glad to listen to anybody in regard to this question, or on the topics he has presented.

The export trade of the country is wide and far reaching in its effects, and there must be some of you who have some ideas upon that qeestion. We will be glad to hear from Mr. GRANGER of Providence.

Mr. W. S. GRANGER. Mr. President, in regard to the remarks of Mr. TOMPKINS, I heartily coincide with them and believe that in 50 years, the trade of the Pacific will be larger than the trade of the Atlantic. There are from 500,000,000 to 600,000,000 inhabitants in China and the East who are large purchasers of cotton goods. I predict that 100 years will see San Francisco the third, if not the second, city in the United States. A hundred years ago we were manufacturing only about 2500 tons of pig iron in this country, while this year will see an output of 14,000,000 tons. An English friend of mine once remarked to me, "Confound your protective duties, we want some place to send out surplus." Now, we want our own domestic trade and our share of the trade with China and the East. I do not think that the most sanguine mind can realize the future prosperity of this country. The manufacturing of iron will be confined to the South and West as well as the coarse and medium qualities of cotton goods; while the manufacturing of the East will be confined largely to finer goods.

The PRESIDENT. Shall we hear from any other gentlemen on this subject. If there is no further discussion, we will pass on to the next order of business. The Valuation of Manufacturing Property for Taxation by Mr. CHARLES T. MAIN of Boston, Mass., will be read by the Secretary in the absence of the author.

# VALUATION OF MANUFACTURING PROPERTY FOR TAXATION.

CHARLES T. MAIN, Boston, Mass.

As every item of expense which enters into the cost of goods is now closely scrutinized, the item of taxes has received considerable attention from some manufacturers, and more will be heard from in the future.

With taxes ranging above $15 a thousand and a high valuation on the plant the item of taxes is a very appreciable one in the general expense account.

There are very good reasons for thinking that the valuation is placed too high in many instances, particularly with old plants, and it is the purpose of this paper to explain these reasons, and to show the methods used in determining the value in two cases which are now before the court, the decision of which is awaited with a good deal of interest, as the cases for the mills have been put in on somewhat new lines.

Some portions of this paper have been reprinted from a paper presented by the writer to the American Society of Mechanical Engineers in December, 1897.

The Public Statutes of Massachusetts states that the assessors shall make a fair cash valuation of all the estate, real and personal, subject to taxation. Strictly interpreted, cash value means market value, and market value has been defined by the court, substantially, as the sum which one party, who has the capital and who desires to purchase, would be willing to pay for a plant, the owner being willing, but not forced, to sell.

## ELEMENTS OF VALUE.

Into the market value of a plant enters the broad element of location, with its varying hours and price of labor; skill and abundance or scarcity of operatives; cost of transportation of raw material, supplies, and finished product; cost of fuel or power; cost of construction and equipment; and rate of taxation. Also the narrower and more restricted element of the physical condition of the plant and its relative value to a new plant constructed upon modern principles, and constructed with all regard to the economical production of a finished product of the best quality of the goods manufactured. The standard of value should be a modern mill constructed as described above, and located so as to avail itself of as many combined advantages as possible.

The ultimate value of a plant is its capability of producing a profit, and into the possibility of producing a profit enter all of the above items and perhaps some not mentioned.

## EXCEPTIONS TO ABOVE IN TAXABLE VALUE.

It would seem that some of the items which enter into the market value must be ignored in determining the taxable value. The element of location and its effect upon the running expense must be eliminated from the problem, and the assumption made that the location is a favorable one for the transaction of business.

It is not at all improbable that some mills which are running at a loss, or making a slight profit, would be better off to abandon their present site and move their machinery to some more favorable location.

It may have been that when such a ruling was made by the court the choice of locations was not as wide as now, or that it was made to cover all property in a general way, much of which is not affected by these questions, and that it was intended not to consider such broad questions as must be considered by a purchaser, and which to him might render a property of no value, and yet it might represent a large amount of property.

It would seem, therefore, that in considering the taxable value of a mill, the assessors must ignore the broad questions of labor, location, transportation, etc., and confine themselves to the physical condition of the plant existing at a certain place, which place is assumed to be advantageous to the carrying on of the business.

Assuming that this is correct, the problem is very much simplified, but is yet complex enough to suit any one, and can be viewed in differents ways from different standpoints. This great difference comes in the manner of interpreting the words "physical condition," as to whether the interpretation stops in describing so much plant consisting of buildings and machinery and the condition of the same, or whether it not only describes the plant and its condition, but also the effect of its condition with regard to arrangement and character of buildings and machinery upon its earning capacity.

## METHODS USED.

In each of the cases which are now before the court the representatives of the mills have maintained that the proper measure of value is a modern mill capable of producing the same product in quantity and quality as the present mill produces. The representatives of the cities have maintained that the measure of value is the cost of reproducing the existing mill at the time under consideration. If these two lines are followed out with an old mill the results will vary very widely, and the question for the Court to decide is which one of these methods is the proper one for determining the taxable value.

There can be no doubt that the former method, or that used by the mill, is the proper one to use to determine its selling value. It is the method which the prospective purchaser would use.

## DETAIL OF METHOD USED BY MILL.

In determining the valuation, comparison is made with the cost of a new and model plant, and between the costs of operating the

old and new plants in so far as the organization of the old plant is detrimental to economical running, when such poor organization cannot be rectified. When it can be changed to a proper organization, the cost of making this change must be deducted from its value, if such defects did not exist.

The value does not necessarily depend upon the first cost of the property under consideration, which might have been excessive at the time of its inception; nor necessarily upon the first cost today of a plant identical to the one under consideration; for a smaller plant, owing to improvements, might be installed today which would produce the same results as the one under consideration. The first cost to be used in comparison, then, is the cost today of a plant which will produce equal results in quantity and quality to the one under consideration.

BUILDINGS.

The value is determined by comparison with the cost today of a new structure with all the modern and improved ideas with regard to style of construction, large amount of window area, arrangement and size of rooms and buildings with reference to convenience and cost of operation and space occupied.

A mill or building with the old style of joisted construction, with low stories and small windows, and with a large number of small rooms, even if new, would not have the value of a modern mill building, with higher stories, large percentage of window area, and large, clear floor areas.

To get the value of a building, the cost of a new and modern building should be depreciated.

*First.* For the difference in style of construction.

*Second.* For lack of light which makes it necessary to produce more artificial light.

*Third.* For the amount of floor space which is unavailable, due to the subdivision of the space or to the style of construction.

*Fourth.* For the increased cost of operation due to inconvenience of arrangement of rooms or buildings.

*Fifth.* For the increase in cost of insurance over that on a modern mill.

The amount of this depreciation for the difference in style of construction varies, decreasing as the building approaches in strength, form and convenience that of a modern structure. The depreciation for lack of light can be determined if it is known how much more artificial light must be burned, and the extra expense of the same, and capitalizing this at the proper rate of interest. The depreciation for inconvenience and extra cost of running can be determined if the extra cost of running is capitalized at the proper rate. The depreciation for unavailable floor space is just the percentage which cannot be used. The depreciation on account of higher insurance rates can be estimated by ascertaining at what rate the factory insurance companies would take the risk with buildings constructed according to their ideas, and finding the difference between the cost of insurance on the old plant and the new one. This difference would represent interest on the sum which one could afford to lay out on new buildings, or the sum which the old buildings should be depreciated on this account.

EXPENDITURE WARRANTED BY SUCH SAVINGS.

The proper rate at which to capitalize these amounts would vary according to the idea which a person might have as to a satisfactory return for the money expended. This was very much discussed in the two cases mentioned. The amount used by the witnesses for the mill was ten per cent. on the assumption that any one would be willing to make an expenditure towards new buildings which promised an immediate return of ten per cent. on the investment, but would not be willing to invest in property of this sort, whose value rapidly diminished and the relative return in comparison with that from newer structures would soon fall off.

It was claimed by the counsel for the cities that five per cent. was a proper rate to use, and if this rate had been used instead of ten per cent. that the total value of the property would have

been destroyed, and that the taxable value would have been found to be nothing.

It might be possible by certain changes to make the buildings as light and convenient as modern buildings, and if new, they would be equal to the cost of such modern buildings minus the cost of making the changes.

After determining the value of the buildings, if they were new, according to the above method, there remains to be applied the depreciation from age. This to a certain extent must be an arbitrary quantity, but based upon the average life of buildings of the character of those under consideration. It would seem that one per cent. a year is little enough for brick buildings substantially built, credit being given for any extraordinary repairs, renewals, or additions.

We must not lose sight of the fact that, although a building may not at the end of 100 years be completely worn out, the character of the business may so change that the buildings are not adapted to it, and that they will be rebuilt, as we have seen the older buildings replaced with new ones of different styles.

The depreciation of wooden buildings is greater than brick, depending upon the purpose for which they are used. Buildings which are kept dry, and not subjected to much wear and tear, would, if well built, last a hundred years; while wooden dye-houses, subjected to steam and wet, will not last over, say, twenty-five years.

The length of life depends largely upon the care which has been given to repairs. If the roof is kept in good condition and woodwork well painted, the depreciation is less than if no care is taken.

If any marked renewals have been made, credit should be given for them. A whole new floor or roof may have replaced an old one, thus making that portion practically as good as new.

The first cost of a modern mill is the measure of value for the building under consideration, and not the first cost of this particular building; for the building may have been built in a very expensive way, highly ornamental, or in a location which caused

very expensive foundations. None of these extra costs add anything to the productive value of the plant, and therefore must be sunk out of sight.

### MACHINERY.

The two most important things which determine the market value of machinery are:

*First.* Its comparative ability to turn out a product in quantity and quality equal to that of the most improved machines.

*Second.* Its actual condition with respect to wear and tear.

Although a machine may not be worn out, or even may have been run but very little, it may be unprofitable to run, because other machines have been introduced which do so much more or much better work. These machines may be used to advantage in some other concern, and may on this account have more value than scrap. Parts of machines have been improved so that these portions may be changed while leaving a portion of the machine as before; as for example, cotton spinning spindles, so that depreciation might be applied to a portion of a machine instead of to a machine as a whole.

The depreciation for actual wear and tear will vary with the severity of the work done, speed of the moving parts, the care taken in the running, and the amount laid out in repairs.

It seems to me impossible to separate the depreciation from wear and tear altogether from that due to improvements, in arriving at its present value, and it is customary to treat them in a general way, allowing a definite depreciation to cover both.

Any concern which does not lay aside, at least, five per cent. of the total value of its plant if new, and apply the same at intervals towards the renewal and improvements, will find itself at the end of twenty years in a position not able to compete with success with modern equipped concerns, and it will be necessary to make radical changes at great expense calling for new capital.

It is often stated that there is no depreciation during the first year of running; that the machinery will do better work after it

is limbered up and adjusted than when it is set to work. As a matter of fact, depreciation does begin immediately, although not perceptible. After the first year, depreciation is charged sometimes at a uniform rate of five per cent. over all the machinery, due allowance being made for any renewal of parts outside of ordinary repairs. I have used in several cases a depreciation of five per cent. up to the dressing room, and four per cent. for the dressing room and beyond. This view has been presented to me by a member of the Society of Mechanical Engineers, that after the first year the depreciation should be marked off five per cent. to ten per cent. a year until the value is brought down to one-half the original cost; then to maintain its value about level for a while, until it becomes apparent that it would soon be profitable to replace the machinery, when the depreciation goes on at a more rapid rate. This method may be profitable for a mill to pursue in its own bookkeeping, but it is not quite definite enough in making up a valuation for purchase, etc. It is sometimes the case that some of the machinery is older than these rates would allow them to be in existence, but they may be still there, perhaps for the same reason that the bridge remained which the engineer had figured could not hold up its load. When asked how he explained the fact that it did stand up, he said that the only reason that he could give was that it stood from force of habit. Some machines remain and do work long after it would be profitable to replace them. The value of such machinery to a purchaser is practically nothing, except that it may complete the organization of the mill and allow it to run until it can be replaced by new machinery.

If a sinking fund is created for replacing the machinery, three per cent. of the cost would replace it in twenty-four years. There is usually some value to machinery in a mill, even if the property were to be dismantled; but old machinery has no value except for scrap, which is very small, as the cost of taking down is about as much as the value of the scrap.

## SHAFTING, BELTING AND PIPING.

In an ordinary white mill it is known approximately how much these items should amount to if new. It is possible that more than is actually needed to do the work has been installed, and although the cost may have been more, the value would be no greater than if the proper amount required for a modern mill had been installed. In fact, it may be a detriment to the mill to have more shafting and belting than is required to transmit the power in a well-designed mill, inasmuch as more power is required to drive the mill than would be required with a more simple arrangement.

In a mill which is not a plain mill, the safest way is to make a schedule of all shafting, belting and piping, and to make an examination to see if they are of the proper size and strength, or if they will require replacing, and to see if the bearings for shafting are such as to produce a minimum of friction and maximum economy of oil, and to see if it is worn. With belting, if a mill has been running for sometime, it is customary to place its value at one-half the cost if new, for the machine belts are being renewed occasionally. With piping the examination should be made to see if the steam pipes are proper for the most economical method of heating, or if they would have to be replaced, and if the pipes for hydrants and sprinklers themselves are such as would be approved by the factory insurance companies, or would have to be replaced, and to see what the condition of the pipe is. It should also be noted if the steam pipes are properly covered to prevent radiation.

## SUPPLIES.

It is also known about how much is required to equip a new mill with supplies, but probably the safest way to put a valuation upon these is to make a schedule and note the general condition. It is customary to call the value of supplies one-half their cost new, as they are constantly being renewed, and that is probably as good an average value as could be given for a mill which had run for some years.

In most cases it would not be necessary to schedule shafting, belting, piping and supplies, but it would be near enough, and within the limits of error on the larger items of value to treat them in a general way.

### LAND.

The value of the land where restrictions are placed upon it in connection with water power is a nominal sum, and the burden of taxes might be great if the values were placed as high as adjacent land used for other purposes and unrestricted. It is of no more value for manufacturing purposes than a lot in an open field, instead of being located perhaps in the congested portion of a city. The valuation should be moderate in order not to make the tax too great in proportion to the purpose to which it is put.

### WATER POWER.

The taxable value of a water power privilege should be ascertained in comparison with the cost of steam power produced in the most economical method at any convenient location where coal is cheap, or by comparison with the cost of other water power favorably located. Unless this is done false values will be obtained. If the value of the water power varied directly as the cost of fuel, then the farther from a railroad the power is located, and the more it costs to haul coal to it, the more valuable would be the power. If raw material is to be brought to the mill and finished product to be taken away, it is a self-evident fact that the nearer the railroad or seaport the mill can be located the more valuable the power which drives it.

### SUMMARY OF METHODS USED BY MILL.

1st. Determine amount of machinery required to produce the same results as the mill under consideration.

2d. Determine floor space required for this machinery if arranged in rooms of proper size.

3d. Determine savings which could be made by having well-arranged buildings and rooms.

4th. Capitalize this saving at ten per cent. and deduct same from cost of buildings of modern mill. The result is the value of present buildings if new.

5th. Depreciate buildings still further if necessary for poor style of construction, bad light, etc.

6th. Depreciate still further for age. This final result is the present value of the existing buildings.

7th. Determine savings which could be made by having modern and well-proportioned machinery.

8th. Capitalize this saving at ten per cent. and deduct the sum from the cost of proper amount of modern machinery to do same work as present machinery. This gives the value of present machinery if new.

9th. Depreciate this value if new for wear and tear and this gives the value of the existing machinery.

10th. To the 6th and 9th results add the value of shafting, belting, piping and supplies, which are based on the cost of same for a modern mill, also the value of the land, water power, water power plant, and any other taxable property which the mill may own.

Although the arguments have not been made yet, it appears that the chief criticisms brought against the methods are as follows:

1st. That the witnesses do not know whether any or all of the present machinery is working to its maximum capacity, and therefore do not know but what a greater product could be turned out with the existing machinery, and if the mill could be made to produce more, the size of the modern plant with which it is compared should be increased.

2d. That it may be possible to run the existing mill with a less number of hands, and that the saving with the modern mill is not as great as it would appear to be. The answer to this is that the effect of personal management must not enter into the problem, and that it is not a difficult matter to tell how much labor could be saved when running the present and modern mill

under the same kind of management, which is assumed to be good.

3d. The method of capitalization is quite a bone of contention.

4th. The depreciation for age it is claimed should be made for only such depreciation as is visible.

### METHOD USED BY CITIES.

The testimony for the defendant in one of the cases is not all in, and for the other case it has not been commenced. The writer is, therefore, anticipating some of the methods which will be used, and may be in error, but in general it will probaby be as described below.

Determine the cost of reproducing the plant exactly as it stands on the date under consideration, and depreciate this for such wear and tear as is visible to get the present value.

### BUILDINGS.

An estimate is made of the cost of reproducing the buildings exactly as they exist. If they are small and narrow buildings with many rooms, where a few large rooms would be proper, the cost per square foot of floor space would be more than that for larger and wider mills; and the value of the old mills is represented as more than that of a modern mill. More square feet are required per spindle because of waste room caused by the subdivision, and the value is thus again represented as more than for a modern mill. Any especially expensive work which it has been necessary to do in the way of extra heavy foundations, piling, bad soil for excavation, etc., are clearly a part of the cost, but do not add anything to the value.

After determining the cost of replacing these buildings, which is called the first value, or value if new, depreciation is allowed for wear and tear, which is determined by an examination of the buildings and estimating what sum would be required to put them in as good condition as new, as far as such examination is able to reveal. This amount, deducted from the first cost, gives

the present value. No depreciation is made for any other reason.

This method is improper because depreciation is going on which is invisible. An examination may show how much top floor must be relaid, but it does not show the condition of the planks or timbers. There may be no visible sign of depreciation of masonry, which if properly built will last a very long time, but not forever. There is no allowance made in this method for the advance in the art, which in itself alone will in time require remodeling or rebuilding of the buildings.

### MACHINERY.

An estimate is made of the present cost of installing machinery identical with that in the mill. This is called its value if new. An examination is made of this machinery to see what its physical condition is regardless of its age, and if frequent repairs have been made on it, its value is said to be equal to new. Some slight depreciation may be allowed for wear and tear, and this depreciated value is called its present value.

No depreciation is made which is not visible, and no depreciation is made for the advance in the art. Depreciation does, in fact, begin immediately, and no one can escape the decrease in values due to improvements in machinery, which increase the product and decrease the cost of production.

### SHAFTING, BELTING, PIPING AND SUPPLIES.

A schedule of these is made and their first cost estimated, which is called the first value. This is depreciated for wear and tear. In an old mill poorly arranged and with more machinery than would be required in a modern mill, all of the above are in larger quantities than in the new mill and apparently the value is greater. The fact is that instead of being of greater value they have less value for producing the same results, for the expense of running and maintenance is greater than with the smaller and less complicated plant.

LAND.

The value of the land is determined by comparison with the value of adjacent land, or by sales of similar land oftentimes unrestricted and to be used in smaller lots for a different purpose.

WATER POWER.

The value of the water power is determined by estimating the cost of producing steam power at this particular location without reference to any other uses of steam. This yearly cost is capitalized at four or five per cent. and the sum is called the value per horse power of the water power.

This method does not take into account the cost of producing water power, the cost of maintaining and running in nearly all cases of a supplementary steam plant, or the uses for exhaust steam. It assumes that the value of water power increases with the increase in cost of coal. The latter is true if the location is fixed, but it is not true, as stated before, that a remote water power is more valuable than one near a city because of the fact that it costs more to obtain coal at this remote place. There are other considerations which tend to reverse the proposition and make a water power of more value which is near a city than one which is remote. The method of capitalizing at a low rate forever implies that the future relative cost of steam and water power will remain as at present, which does not seem to be at all probable.

SUMMARY OF METHOD USED BY CITY.

1st. Determine cost of reproducing existing buildings exactly as they are constructed. This is the value if new.

2d. Depreciate value if new by an estimated amount determined by an external examination of the various parts which can be seen. This gives the present value of buildings.

3d. Determine cost of replacing the machinery in the mill by similar machinery. This is the value if new.

4th. Depreciate value new for wear and tear by an estimated

amount determined by an examination of such parts as can be seen. This result gives the present value of the machinery.

5th. Make a schedule of shafting, belting, piping and supplies and estimate cost of installing same.

6th. Depreciate first cost for any visible wear and tear to get present value.

7th. Estimate value of land from value of adjacent land.

8th. Estimate value of water power by capitalizing yearly cost of steam power at a low rate of interest.

9th. Estimate cost of reproducing water power plant as it is, and depreciate for wear and tear as above.

10th. To above present values add value of any other property belonging to mill.

It is substantially between these two methods that the Court must now decide, and this decision, which is of much importance to manufacturers, is awaited with interest.

The PRESIDENT. Gentlemen, the paper is open for discussion. It presents very interesting subjects. Those of you who are interested in the amount of town and city issue, we shall be glad to hear from on any point in the paper.

Mr. ARTHUR H. LOWE. Mr. President, it seems to me that this is a subject we should discuss more with our local assessors than at this meeting.

We appreciate the importance of this paper, however, very highly, as a lesson in the problem which we have to work out with our local assessors.

Mr. CHARLES W. DENNETT. Mr. President, I would like to ask some gentleman here through the chair, some one who has more experience than myself, what you are going to do with an assessor who tells you he must tax the value of a mill in proportion to the amount of the city debt. I had an assessor tell me that this year.

Mr. JOHN E. PREST. Mr. President, it seems to me that our assessors tax us without reference to wear and tear, or age of buildings, etc.

The PRESIDENT. There is a great deal of ignorance of manufacturing property with the average assessor, and I do not think they are quite up to the times with regard to the questions of assessment.

Mr. ARTHUR H. LOWE. Gentlemen, I think the President has stated it exactly. I would like to ask some one who has more experience than I have had, what you are going to do with assessors who continually advance the valuation of your property without reference to its age, without reference to the condition of business, or to its earning capacity or any of those things, and without entering into its actual value.

Mr. STEPHEN A. KNIGHT. Mr. President, it seems to me

that this Association could well afford to distribute this paper to very many of our assessors.

Now, I know of instances, where the town tax requires eight dollars per thousand, and I know of others where the town tax requires nineteen dollars per thousand, and the assessors insist that they shall put the same valuation per spindle upon the property that requires a tax of nineteen dollars, as they do upon the one that requires a tax of eight dollars. Now anyone can see at once the ridiculous attitude of this proposition. While one man pays a tax of eight dollars, another pays nineteen dollars, notwithstanding that the values are precisely the same. Therefore one man is paying nearly twice and a half as much as the other. My experience has been that assessors are not always the most profound men we have. [Laughter.]

Assessors in some of the towns where I am myself interested, are the men that will do the political wire pulling, and the dirty work of the town, and I would almost think, as I said at first, that it would be to the advantage of this Association to distribute this very able paper among the assessors of our various towns. I don't think it is perhaps within the province of this Association to do that, but it is certain that that is the class of people that need to be educated. [Applause.]

The PRESIDENT. In thinking over this subject with reference to the general taxation of industries, manufactories, etc., it has always seemed to me that there was no near solution of that question, under the present system of taxation. I think we ought to have a commission to take into consideration all sides of the question, and lay down rules so that there could be a systematic taxation of the industries everywhere, and rules which the assessors could not override. I don't see that there is any other remedy for the manufacturer, or for any of the industries of our people, so long as we are in the hands of the assessors who are in themselves the tools of the politicians, who override us in our manufacturing cities, so long as we shall have to meet the question and fight it out before the law, the amount

that we are assessed and taxed. It is only the judiciary of our country that settles those questions, so if we would prosper, if we would have the same conditions existing among the manufactories in the state, why, we should have some definite system laid down and over which the assessor cannot ride.

Mr. ARTHUR H. LOWE. I would like to inquire if we have not such a commission as you refer to, in Massachusetts to whom those that feel that their taxation has been increased unwarrantably can appeal, and that they, the commissioners, have found it very difficult in most cases to equalize the valuations. The taxation, as we all know, depends on the amount that must be raised upon property that lies within the limits of the city or town. That property must be valued sufficiently to raise that amount of taxation. Consequently it is a question of appropriation primarily, and that is the difficulty.

I think in most of the manufacturing cities in Massachusetts, they have become so extravagant in their appropriations for educational purposes, for water, and for sewerage and police and fire protection that taxation must necessarily be very high.

Most manufacturers in every city feel disposed, as I believe, to pay their fair proportion of taxation. Now, that fair proportion is to be determined by those assessors, and, as Mr. KNIGHT says, if we could only educate those assessors to arrive at a fair valuation of a manufacturing plant in comparison with the balance of the property in the city, I think we would accomplish a great purpose.

This is a very important matter, especially for the New England manufacturers, because we are in competition now with other sections of the country where taxation is so much less.

Mr. WALTER E. PARKER. It seems to me that the paper represents a condition of things which is going on all the time, that is, depreciation of the mills and machinery. That point is the clearest one that has been brought out in the paper. Now, on the other hand, we have in our cities and towns a constantly

increasing expenditure, and the theory of the assessors is, that with the plant established in the town, the company will keep up that plant to its original value — it is wearing out to be sure — but the company is earning its dividends, and a surplus, and lays that to one side in order to put that plant in good condition when it is worn out, so the assessors assume that it is a very proper thing to continue to value that property at the end of ten years, or fifteen years, just the same as they valued it when it was first constructed. I don't know but that it is a fairly reasonable and sensible theory. Otherwise you would have fluctuations in value all over the city, because the assessors have got to raise just so much more every year. I take it that the two points are somewhat antagonistic, at the same time, I think that looking at it from these two points — from the assessor's point of view, and from the manufacturer's — that there is a disagreement there which we cannot quite overcome.

Mr. JAMES P. TOLMAN. It seems to me that those of us who are manufacturing under corporate organization in Massachusetts are relieved from some of the embarrassments in this situation in the fact that we have to pay a tax to the state on the valuation of our capitalization. The state commissioner comes along and finds out how much we have to pay in local taxation, and then charges us the balance according to the market valuation of our stock, and it seems to me more desirable to pay our tax money into local places where the works are, rather than pay it to the state. So I have felt that it was no great harm to let the local assessors get all they can out of it, as I would rather pay it locally than to the state, and therefore I have a feeling that it does not do us a great deal of harm under Massachusetts laws to pay what the assessor asks.

There is one other point that sometimes occurs to me, that those of us who have to pay a tax on manufacturing property would usually be very sorry if under a loss, the insurance companies were to consider the valuation on the same basis that we ask the assessors to consider it. I think most of us would be very sorry to have our insurance at no higher rate than the assessors value our property.

Mr. JUSTIN A. WARE. I think this question of educating assessors a very interesting one. If he can be educated, by all means do so. It is well to spread all the literature on this point that would tend to educate the assessor.

The basis on which assessors generally work in municipalities, is the question of how they can raise the money to meet the appropriations that have been made, and they look their lists over, and figure out, and find they are short so much money. Then they look back over the lists and figure out how much this or that corporation can stand in bringing up the amount required. Then they mark up again, and then they tally it, and find they are still short so much, and they go back again over the lists, and figure *how much more* this or that one can stand. I think that is the method of the assessors. The assessors know nothing about the plants, and furthermore, they don't want to know. Their method is such that they don't need to be educated, they don't want to understand at all. They *must* furnish just so much money to keep the city running, and it has got to come on the manufacturers who will stand it and kick the least. That is the basis on which it is done in most large cities. Now, what is the cure for it? In my opinion there is absolutely no positive cure that can be carried out. The money has to be raised to run the city, and the largest plants that will stand the biggest tax have got to submit to it.

Mr. CHARLES W. DENNETT. I think the last gentlemen who spoke is perfectly right. In my town there is one old mill and one new one, and when the assessors came around I said to them "You should not put the same assessment for floor space on the old mill as you do on the new one," and they astonished me by replying that it did not make any difference at all.

The PRESIDENT. It seems to me the manufacturers have to fight the battle out for themselves, and as we are at present constituted, I suppose that we shall all have to fight our individual battles in regard to how much we are assessed.

Mr. GEORGE E. TUCKER. I agree with the remarks just made by the President. I believe that each one must fight the battle with their own individual assessors. For years we have been laboring with our assessors to reduce the valuation. Our method has been to work carefully with them, and if possible to get a small reduction each year on the ground that we must have something for depreciation. Last year we were able to get off about $40,000 and this year, say, $10,000 to $15,000. In our small town of, say, eight thousand inhabitants the manufacturing interests are really all there is to the town. If it were not for the woolen and cotton mills there would really be nothing to keep the town alive. The assessors have to raise the amount appropriated. They look about the farming district, and as it is hard on the farmers they naturally put it on to the manufacturers, whom they think can stand it best, having very little regard for the real merits of the case.

Mr. WALTER E. PARKER. Mr. TUCKER, I think, has emphasized what Mr. KNIGHT brought out. The difficulty of the whole matter is that there is a lack of uniformity in the state of Massachusetts, just the same as all over the United States, and it is just the methods that has been pursued by Mr. TUCKER, and by all of us, that has brought about lack of uniformity in the matter. His mills may be taxed $10 a spindle, and another mill just like it, in the same state $20 a spindle. Now, I think the President is right in saying that we ought to have a commission to establish the value as nearly as possible all over the state for similar plants.

Mr. ARTHUR H. LOWE. In reply to what Mr. PARKER said, just a word. It seems to me that the difficulty in establishing uniformity is the fact that, as I stated before, the appropriations differ so much in different cities where our factories are located.

The assessment for taxing purposes must be based on the total taxation of the district which has to pay the appropriations which have been made.

Mr. STEPHEN A. KNIGHT. I want to say that we are not all as fortunate as Mr. TUCKER. If we could persuade our assessors to decrease a little each year, I think it would be very nice. I have been trying that for the last ten years, and every effort I have made has resulted in an increase, so that we find there is a difference in men — whether it is a difference in the owners of the property, or whether it is a difference in the assessors I am unable to say.

Mr. S. S. SPENCER. I think that in this matter we are entirely in the hands of the politician. In Pennsylvania the politicians have their friends that want large salaries, and we have to raise the money to pay them, and the value of the property does not have very much to do with it, it is simply what the politician wants, and they increase the salaries and increase the taxation in proportion. We cannot get away from them, they vote us down, and vote in such men as will do just as they wish. The assessors in our part of the country do not have much to do about it, any more than to do just as they are told.

Mr. CHARLES W. DENNETT. I want to say a word. It seems to me that the valuation is something that is fixed all over the state — it is equal, or should be equal — and that the amount of appropriation ought not really to have anything to do with the valuation, which the law says shall be so and so, but I think we should make the valuation right, and then we could change the rate. It seems to me that is what should be done. I cannot see for myself how a big city debt is going to change the value of the spindles in a mill.

The PRESIDENT. Is it not possible that we might find a remedy in HENRY GEORGE'S system of land tax? Then there would not be any valuation on the machinery at all.

Mr. ARTHUR H. LOWE. There have been seasons when machinery has no value.

Mr. CHARLES T. MAIN. (Added since the meeting.) I am free to confess that I do not see how the assessors can grapple the many problems which enter into the valuation of a mill, and that it is not until an appeal has been made to the court that there can be very much intelligent discussion of the various items which go to make up the sum total of the valuation.

It does seem, however, that some broad principles could be formulated by a commission appointed for that purpose which would tend to make more uniformity in the valuation. The rate of taxes will and must vary in different communities with the total valuation of the property in that place and the amount which is required or used for public purposes. It would, therefore, be impossible to make the rate or amount raised in various places have anything like uniformity.

It would be possible to lay down some general rules which would assist in determining the values of the buildings so that they would compare with proper buildings of a new plant for the work done. For instance, in an old plant a large number of expensive buildings or additions may have been built, the aggregate cost of which would be far in excess of the cost of a modern structure designed for the same work. Their value for the purpose for which they are used, however, cannot be any more than that of the modern structure, and probably is less.

It might be possible to regulate the square feet of floor space to be taxed per spindle for plain mills for the portion used for manufacturing purposes proper.

It might be possible to fix a percentage of the first value of a plant below which it may be assumed that the depreciation must and will not be allowed to go, and to fix the taxable value as this percentage of its new value.

It might be possible to regulate in some way the value of land so that it might not be excessive, and to fix upon some rational basis for the value of water power.

All of the above are suggestions which would require study to work up properly, but which, if they could be applied, would tend somewhat to uniformity in the valuations. It does not

seem that the assessors should investigate the questions of labor, location, transportation, etc., or the question of possible savings which can be made by a different plant than the one under consideration, but should confine themselves to the physical plant existing at the place under consideration.

The PRESIDENT. The next is the paper of Mr. JAMES G. HILL of Lowell, Mass., on The Various Systems of Computing Costs of Manufacture. As Mr. HILL is not present, I will call upon Mr. GEORGE OTIS DRAPER to read the paper.

# VARIOUS SYSTEMS OF COMPUTING THE COSTS OF MANUFACTURE.

JAMES G. HILL, Lowell, Mass.

The question has often been asked, is there any rule or law that governs the cost of manufacturing cloth in cotton mills? The novice naturally seeks the cost of one number of yarn by that of another already obtained but finds the result wide of the mark and very naturally seeks the reason.

For instance, if he has the cost of number 20 yarn, he thinks number 25 ought to cost, say, 25 per cent. more or some certain ratio of increase, whereas the cost may be but little more and is certainly less than 25 per cent. But to conclude from this reasoning there is no law governing the costs of manufacturing cloth is misleading, because we are unwilling to admit our business has no proper methods, but, on the contrary, claim it is a science and has rules that are exact. The rule or law governing the costs of yarns is, that yarns vary as the square root of the third power. But as the manufacturer makes little or no difference for a great variety of counts in the picking, carding, drawing and first process of roving, it is obvious all counts up to and including the first process of roving will cost substantially the same but from this point on the rule holds good in the main.

We all know that in the general run of cotton mills the speed and quantity of picking, carding and drawing is fixed at a definite quantity and only change after the first roving. Theoretically a speed and quantity that is just right for number 25s is too much for 30s and too small for 20s, but as so many and constant changes would be necessary if we varied our quantity

with the counts the labor and trouble would doubtless be more expensive than the injury to the yarn by over producton for the finer counts or the increased cost of the coarser. Moreover the liability to mistakes in changing gears and pulleys by inexperienced operatives would again be a serious objection, for all of which reasons the custom prevails of spinning all counts in ordinary plain mills, at least, from the coarse roving.

To illustrate this point, suppose we take number 22 yarn. This number of yarn will cost in New England, say, about two cents per pound to spin and in considering these costs only the mill costs proper are treated—no general expenses, repairs and cotton are included.

Then if the law above mentioned should be applied to number 20s the cost would be about one and four-fifths cents per pound, whereas the actual cost would be quite considerably more or about one and nine-tenths cents per pound, and inversely if finer counts are taken, and in so far as the costs of the yarns are concerned this difference is wholly on account of the methods of manufacture.

In all general rules laid down for the costs of yarns it is obvious only plain cotton mills, so called, can be considered, because in fancy weaves too many variable factors enter into the problem to permit of any uniform rule even for one such mill, much more any number. It is evident, then, that this law governing the costs of yarns cannot be applied because of our methods of manipulation, then next comes the question what method or system can be used? In all plain cotton mills the best method to adopt is to make the cost for all numbers of yarns up to and including the first process of roving by the pound and beyond that stage by the hank.

But even this method in a mill of a large variety of counts will need a very careful scrutiny or some coarse yarns will be found to cost much below the real cost while the finer yarns may be too high, but this can be corrected by a careful revision of the numbers. To illustrate this point, I have a mill in view which found itself making yarns as coarse as 6s in the same mill

spinning 30s. When the costs were first made up this very coarse yarn was ridiculously low but by using proper numbers for both warp and filling the true cost was easily found and the general method retained.

It may be of interest, possibly, to note what relation the several subdivisions in the different departments bear to each other and therefore I have made the table below showing the various classes of work with the percentages opposite each. I think such subdivisions assist in finding the true costs and also to correct any expensive departments.

TABLE.

| Classes or Subdivisions. | Percentages. |
|---|---|
| Overseeing, etc., | 15.87 per cent. |
| Picking, | 1.45 " |
| Carding, | 4.46 " |
| Drawing, | 2.68 " |
| Roving and spinning, | 18.52 " |
| Ring cleaners, | 0.58 " |
| Back boys, | 1.65 " |
| Doffers, | 2.45 " |
| Spooling, | 3.86 " |
| Warping, | 1.18 " |
| Web drawing, | 1.51 " |
| Slashing, | 0.83 " |
| Weaving, | 44.96 " |
| | 100.00 " |

By an inspection of this table it would appear that if a mill could be built involving little or no transportation and if it was possible to make each operative do his or her full duty, quite a considerable portion of the 15.87 per cent. for general expenses could be saved, but of course all ideal mills are well enough to illustrate what might be, but as we must deal with the practical let us resume the subject under discussion.

Next, in order, is the dressing department and as the true cost varies so little from the cost if made out by the hank

it is hardly worth while to complicate this method by trying to rearrange it and we may therefore deem this system sufficient.

In the last process of weaving two methods may be adopted, the first, to make out the cost by the piece, yard or pound and secondly, by the hank. If the weaving was paid by the pound as in some few mills instead of by the cut or piece, the former would be preferable but in the latter case where the weaving is paid by the cut the simpler method is to make the cost by the hank and thus keep one uniform system.

There is much that might be said in connection with weaving but I fear it would only complicate the subject and become so complex as to be of little value.

To make a correct cost of goods it is evidently essential that yarns should be carefully weighed and accurate numbers affixed to each count, because without this accuracy the mill is deceiving itself.

I knew several years ago a mill that showed the smallest cost of any mill in New England and one of the officials remarked he didn't quite understand it but this mill always showed the smallest cost of any mill he knew and made the least money.

I lay special emphasis on this, because this mill had an inaccurate method of keeping the counts and so deceived themselves with the consequent loss of profit. There are many rules for finding the average numbers of yarns but the formula given below I think is the most accurate, and certainly can be proved.

But before giving the formula let us look into the meaning of hanks, numbers, etc. We number our yarns from one up, but what does this notation mean? We accept eight hundred and forty (840) yards as a hank or skein and when we find one skein weighing a pound we call it number one yarn and give numbers according to the number of skeins in a pound, which is a simple system of counting and very convenient, but I apprehend often leads us astray in getting our average numbers. For instance, number 20 yarn really means that one skein of that size weighs one-twentieth of a pound or three hundred and fifty grains (350) and instead of multiplying the total pounds

by twenty we should multiply by three hundred and fifty (350) to get our hanks, which result is vastly different from the old method and particularly is this noticeable in wide variations, that is where the warp and filling are very coarse and fine.

The formula is

$$N = \frac{P + T}{\frac{P}{F} + \frac{T}{W}}$$

In this formula

Let N equal the average number of yarn
" W " " " " " warp
" F " " " " " filling
" T " " threads per inch of warp
" P " " picks " " " filling

If any member is interested to work out this algebraical problem he will be surprised at the many factors eliminated.

As observed above the old way of getting the average number of yarn was to multiply each description of goods by its average number, add the total hanks together and divide by the total pounds.

It occured to me many years ago that if I multiplied the several kinds by the weight of each yarn a much different result might be obtained and that proved to be the case. Later this formula was deduced from these figures.

To summarize then what has been written in this paper it will show, if we have been sufficiently clear in our statement, that the six essential factors in finding the costs of cloth, are as follows, viz:

1st. Accurate average numbers are required.

2d. Reduce the pounds to hanks or skeins.

3d. Divide the pay-roll of the preparatory processes by the total pounds.

4th. Divide the remaining pay-roll by the total number of hanks for a constant.

5th. Multiply the average number of each grade or description of cloth by this constant.

6th. Add three and five together for your total cost.

Too much stress cannot be laid on the importance of finding accurate average numbers of yarn, especially where many kinds of cloth are made in the same mill.

In one mill I was connected with, generally spinning only one number of warp and one number of filling, the system was simple but the moment we added another kind of cloth the cost began to vary.

After considerable experience and observation I have come to the conclusion that it is impossible to get as accurate costs in a mill with a wide range of yarns as in a one count mill; but while this may be true and at times some special kind will crop out in a marked degree, on the whole this system if carefully pursued, will, for most mills with only a fair variation in numbers, give very nearly accurate costs.

In conclusion I would say that originally when I selected this topic for a paper I intended to confine the subject to the mill costs proper, but later, after a second thought, concluded to briefly touch upon the remaining items of costs.

The grand total of all costs in making cotton cloth may be divided into the three general heads, viz:

First. Mill costs proper.

Second. General expense and repairs.

Third. Cotton.

We have already discussed the first and may now proceed to the second.

The same system may be pursued here as with the first. Divide the amount of general expense and repairs by the total hanks for a constant and then multiply this constant by the average number of each style of goods for the costs.

Third and lastly—cotton. All mills treat this item by the pound, with this difference; some mills increase the cost of cotton by the net waste while the more conservative increase the cost by the gross waste.

Group these three general divisions together and the final result is obtained.

Finally, whatever criticism may be launched at this system of making costs, I feel sure, from long experience, that if carefully pursued no mill can go far in the wrong direction but on the contrary will arrive at as correct a cost of its goods as possible under the varying circumstances.

The PRESIDENT. We have heard the paper of Mr. HILL and I would like to ask if there are any points you care to discuss. If not, we will pass on to the first topical question of the day which is number 117:

117. Can a systematic method of costs be determined for weaving?

I am sure there are some gentlemen here who will wish to speak on this question. There are many points in that question which occur. A woolen manufacturer asked me only a week ago — at least a dress goods manufacturer, who is using both cotton and woolen, as to how he should determine the general expense of his weaving room between the goods that had a different number of picks, one counting 72 picks, and the other 33 picks — how he should determine his general expense. I suppose we should say that all things are possible, and that there is no doubt of obtaining a systematic method of cost applicable to certain circumstances, and certain conditions, but one systematic method of determining the cost of weaving for all mills could hardly be arranged.

Mr. ARTHUR H. LOWE. Our mill is entirely weaving. We make a great variety of colored goods and I doubt very much if the system that we have for determining the cost of weaving would be of much value to anybody else. I should say in other words that this question should be answered in the negative, as far as applying a system to all mills is concerned.

Mr. CHARLES W. DENNETT. I agree with Mr. LOWE. As I was saying to Mr. SPENCER just now, I think it will be an extremely difficult thing to settle on any system by which we can fix a systematic price for weaving. I have a class of goods that I am very proud about. I say to my boss weaver, "I want the weavers to earn enough on that so that they will be interested in it more than in anything else they make." Now, how can you fix a system that will do that? I think that many of you gentlemen have had the same experience as myself, that sometimes we strike a new class of goods, and figure the price of weaving before we begin, and when we come to weaving the goods, we are very greatly surprised. It is extremely difficult while running fancy goods in a large variety of work, to fix upon any system which will apply to all.

The PRESIDENT. If there are no more remarks on this question we will pass to the next topical question, number 118:

118. In large manufacturing plants, having a nnmber of rooms on each principal operation, which is the better, to have one overseer or department man in charge of each special operation, or to have a larger number of men in charge of smaller sections?

What shall we say to that question, gentlemen?

Mr. JOSEPH M. DUNHAM. From what little experience I have had, I should say every time have one man to each department, if you have half a dozen in one building, or where you go from one building to another easily, one man then is responsible for the carding, another man for the spinning, and he can have his second hand under him that would be responsible to him for the work in that room. Also in the spinning room I should recommend having one man who would be responsible for the spinning. I don't care if you have half a dozen small rooms, one man should be responsible for all the spinning. He might have a second hand that would be responsible to him, and then one man would be responsible for each branch of the work.

Mr. CHARLES W. DENNETT. I quite agree with what the gentleman who last spoke says, about having one man in each department. I used to know an overseer who said when a man had two rooms he was like a woodchuck who had two holes. You could never find him in either. I think it works much better to have one man in the weaving room, and there is another advantage, and that is, you have a man in charge of the whole department, and you can pay him better. If you have an overseer of a little room you must pay him small wages, and if you have an overseer in charge of the whole department, you can pay him wages that will enable you to keep a first class man.

Mr. JOHN E. PREST. I would like to inquire from the gentleman how much territory you would give this overseer to control. I would like to ask him how much room he would give one man to look after. I would like to hear from Mr. PARKER very much in that respect.

Mr. WALTER E. PARKER. I think the better way is to have one room instead of many rooms, and that is what we have been doing in our factory, consolidating the machinery, so that we can put different divisions of work under its particular foreman. We have, to be sure, four weaving rooms in the cotton mill, but they are all under one man. I think that that is easier, and works better than it would to have an overseer in each one of those four rooms. At any rate, I never have been in favor of multiplying overseers, and I think the better way is to consolidate your machinery.

The PRESIDENT. I suppose that one way of answering this question would be, that it depends entirely, or largely, upon the circumstances of the mill and the condition under which it is run. It depends very largely upon the size of the mill, and as well upon the size of the man. If we have a small mill and a large man, we may put several of the operations under his charge and make a saving, and do just as well as if we had several men there, but where it comes to large manufactories I agree

very largely with Mr. PARKER in what he said, but the question of course is not limited to any size of mill, and therefore we may say it must depend entirely upon those circumstances.

Now, gentlemen, we will pass on to the last topical question for this session, number 119:

119. In which class of machinery, as at present running, is it desirable to improve the most, to obtain a minimum cost in manufacturing?

Mr. GEORGE O. DRAPER. I think that question is very well answered in this paper of Mr. HILL'S. Turning to page 134, where he gives a table, we will find that the weaving is estimated at 44.96 per cent. of the total cost, whereas the cost of roving and spinning is 18.52 per cent. I have thought that there ought to have been a sub-division there, but it is very evident that the weaving is very largely ahead in expense.

Mr. JOSEPH M. DUNHAM. Mr. President, in my experience I find that if you don't get good yarn, you can't get along in your weaving shop. You must have level roving in order to have good spinning, so that it all depends on the question of roving, as to how the weaving will go on. Poor roving makes poor yarn, and cannot weave to profit.

The PRESIDENT. The next paper, gentlemen, is on Textile Instruction by Mail by Mr. CHRISTOPHER P. BROOKS of New Bedford, Mass.

## TEXTILE INSTRUCTION BY MAIL.

CHRISTOPHER P. BROOKS, New Bedford, Mass.

The subject of Textile Education has been discussed so frequently at the meetings of this Association, that were it not for the fact that this society always welcomes the reports of experiments or new departures, the introduction of the subject again, even from a new aspect, would almost be a trespass on the time of the meeting.

The subject of teaching textiles by correspondence has not, as far as I am aware, been referred to at any previous meeting of this Association. The subject of Textile Technical Education in general has. It has been discussed and favorably reported and commented upon, and judging from the number of Textile Schools, which for a lack of a better name, I will call "Residential Textile Schools", now in operation or being promoted, apparently the subject has met and is meeting with the highest approval of textile manufacturers.

Five years ago there was only one textile school in America. Now there are five in active operation, and probably by the end of the century there will be more.

A residential textile school is limited in its scope. At its best it is practically and essentially a local institution. In the interests of the state or city that founded it, it is best for it to be developed as a local institution. A small proportion of its students come from a distance. For each day student there are six or more evening students, workers in the local mills and machine shops who combine work and study—working in the day time, studying at night. The reason for the small numbers

in the day classes is that there are few men who can afford to leave their work, lose their salary and pay for tuition, board and rooms in order to devote their whole time to studying the day course of instruction in a textile school, while there are thousands of men who hold responsible positions, or who are aspiring to responsible positions to whom the earning of a daily wage is an absolute necessity to their existence; or who hold a position that they do not desire to sacrifice, and yet who desire to attain a technical education and are willing to devote any amount of time and any possible sacrifice to obtaining same. These facts have been impressed upon me very frequently in my connections with the Lowell and New Bedford Textile Schools, and by the occasional criticisms that I have met with that textile schools as at present conducted do not reach the masses of people, and are not broad enough in their scope.

These circumstances two years ago induced me to investigate the possibility of teaching textiles by correspondence. At first I opposed and was prejudiced against the idea, but on investigation, I found not only was it possible to teach similar subjects by correspondence, but that it was actually being done—that electrical schools, mechanical schools and engineering schools were in existence, doing good work in teaching subjects as difficult to inculcate as textiles, and that thousands of students all over the country were receiving very great benefit from correspondence schools of various kinds.

In the cotton mills of America there are plenty of men who are working in one department, or on one machine, and who know nothing of other departments or other machines, and yet they are well aware that unless they obtain this knowledge they cannot hope to be promoted to positions of responsibility. There may be no textile school in their vicinity, and they have not the means to attend a residential textile school. They are sometimes repelled when they seek information from their overseers, and it is a difficult thing for a young man of this description, without influence or wealth, to obtain the necessary information and to climb the ladder of success.

Not only so, but there are many persons whose general education is good, who even have graduated in the higher branches of scientific and classical education, who are placed by accident or influence in a position of extreme responsibility, and who feel the need of knowledge in special branches of their work that they have not an opportunity of attaining simply because they cannot leave their positions in order to attend a textile school.

Alike to the struggling, ambitious worker in his desire for higher position and higher pay, to the man who is already in a good position and wishes to perfect himself, or bring his knowledge up to date; to the manufacturer who wishes to branch out in new lines of industry, to the jobber, the converter, the dry goods merchant, the mill supply dealer, the textile machinist or any person connected in any capacity or in any way with textile manufacturing, there is a want that the residential textile school, admirable as it is, does not fill. It is to these men that a correspondence school appeals.

The method of giving instruction in textile correspondence schools generally adopted throughout America is simple and effective.

Specially prepared instruction papers are printed and issued to each student, which contain simply expressed, clear and concise descriptions and carefully worded explanations of the subject matter under consideration. If it is a machine, the principles of its construction, its objects, the use of each part and each motion, the method of operating it, and a score of other details in connection with its construction, and economical and effective operation and management are explained.

Numerous diagrams are issued for illustration, and it is endeavored to make the description as clear to the student as if he had a machine in front of him. The fact that they are printed gives an advantage. It is very easy to mistake the meaning of a lecturer, or fail to grasp some of the facts that he wishes to teach, but by having a printed lesson the student can refer to it over again and again, if necessary, until he becomes thoroughly acquainted with the subject. It is also necessary that more care

and attention should be given to the preparation of the lessons that have to be printed and issued in large numbers and which cannot afterwards be altered without considerable expense, than to a mere oral address.

After the lessons have been studied, any point on which the student wishes to have further information is brought to the attention of the instructors by means of specially prepared inquiry blanks which are supplied for that purpose.

Frequent test questions or "quiz" papers are given. When the student feels that he has obtained the necessary information to enable him to understand the topic thoroughly, he has sent to him a set of examination papers which he has to work out and send to the school.

When these answers have been received, the instructor carefully corrects them, indicates errors, makes suggestions and criticisms, points out how to remedy mistakes, and endeavors to make the student feel that the comments are for his best interest.

Each student works independently—quickly or slowly as he wishes.

Each student is provided with sufficient work to keep him busy while his worked papers are passing through the mail, still it is optional with him when he shall return the next worked paper; either the next week, the next year or ten years hence.

The papers are graded carefully to certain percentages and if the required mark is obtained the student is passed forward to the next lesson; if not, he is required to review his studies and send in other examination papers until he attains a mark that will enable us to conscientiously certify that he is competent. These written lessons have an advantage over personal instruction, inasmuch as the student has them constantly before him, to refer to when necessary. This is especially desirable for backward students, or those who do not learn easily.

After the lesson is prepared as directed, it is sent to the school, together with such questions as the student may wish to ask. The teacher examines everything with the utmost care

and then returns the papers, together with such suggestions and criticisms as will enable the student to understand the work thoroughly. In this way every mistake is pointed out and everything learned correctly.

Numerous blanks are supplied for various purposes so that the student may have as little trouble as possible in obtaining further information on any point not clearly understood, or to any request for information that has a direct bearing on the section of the subject that he is studying.

The system is both cheaper and immensely superior to studying from text books. The text books which refer specially to American machinery and processes are very few in number, and where such books are of any value, the author is usually so deeply learned in his subject that he omits to make it sufficiently plain to be understood by the ordinary student. Advanced mathematics, chemistry and other sciences are found in these volumes, until they are almost unintelligible to an ordinary reader, and the student before having read very far usually closes the book in disgust, having no one to refer to, or inquire from, to explain the difficult points.

The library of books that covers all the points mentioned in our lessons cannot be purchased, as they are based on the experience of men which has not previously been published, but a library of books that even approximately covers the course would cost considerably more than the fee charged.

It is not necessary to make a comparison of correspondence schools with a regular residential textile school: each has its own field of labor. The residential school caters for the local mill help and for those men who are fortunate enough to be able to defray the expense of a two years' or three years' course of instruction which occupies their whole time, and if taken in a well equipped and well managed institution with a good staff of instructors, is undoubtedly one of the very best methods of obtaining a textile education.

The correspondence school on the other hand aims at educating those men who have their living to earn, and who wish to

learn while they earn; who study at night and put into practice in the day time what they have been studying.

The popularity of a correspondence school of instruction is shown by the fact that there are now students in every manufacturing state of the union in the American Correspondence School of Textiles, which is the only textile correspondence school in the world in active existence and teaching the processes of manufacturing. Not only in this country, but students from India, England, Canada, and other countries, are also found on the enrollment books of the school, and the frequent, almost daily, letters of approval show the popularity and satisfactory character of the methods adopted.

The correspondence school system is essentially an American institution. Ten years ago the first of the present correspondence schools had not been established. Today there are over 100,000 graduated, or present students of the various correspondence schools of America, and it appears to me that the fact of such institutions existing in order to give efficient, thorough and practical education to mill men who wish to hold a position of authority and responsibility, enabling them to be well posted in the processes of manufacture, the construction of machines, their care and operation, and in many other details of manufacturing, and at the same time to educate men in this manner in large numbers so that they may be drawn upon by manufacturers to help develop the textile industries of this country, is a subject worthy of being placed on record.

Mr. ARTHUR H. GULLIVER. Mr. President, I would like to ask Mr. BROOKS a question. I happen to have in my employ quite a number of men who have been in this school of engineering at Scranton, Pennsylvania. As a rule they are the most capable ones in their department, and they seem to be the ones who are most anxious to take it up. In some cases they are young men who have had some of the disadvantages Mr. BROOKS speaks about — insufficient training, and being obliged to go to work when they ought to be following common school branches. Now I find that those young men, with the exception of one, took that instruction for a long time; I know one who has been at it for two or three years and who has not yet completed the course he started.

I want to find out from Mr. BROOKS as to whether in this Textile School which he speaks about, and of which he is the originator, it is possible for a man that does not do any faster work than that I have mentioned, to be pushed ahead, so that he can complete it in a reasonable length of time. This man that I mention who has been studying for three years is a very capable man — he is an engineer. One branch in which he wanted to fit himself a little more thoroughly was electrical engineering, and as he was deficient in his mathematical studies, he was obliged to stop and take up arithmetic and algebra. The point is whether this Textile School has in view a definite time for the course; does it intend that a young man in eighteen months or possibly two years can succeed in qualifying himself in the branch he selects; do they drop him then if not through or keep him on the books?

Mr. CHRISTOPHER P. BROOKS. In answer to Mr. GULLIVER'S question I would say that the Scranton school of correspondence insists that each student should go through a course of algebra, arithmetic and trigonometry which occupies a great amount of time. A man can enter our correspondence school and go along as quickly or slowly as he likes. It is possible to get through the whole course in about a year by putting in perhaps

two hours each evening. On the other hand, if a man takes ten years in our school, there is no objection made to it and there is nothing more to pay.

Mr. ARTHUR H. LOWE. I would like to ask Mr. BROOKS two or three questions, for I think we are all interested in this Textile School in New Bedford, and also in textile education. I would like to ask him how many students he has now on his list of correspondents, and what has been the success of his school up to the present time.

Mr. CHRISTOPHER P. BROOKS. In answer to that question I would say that there are several hundred students on our books.

Mr. ARTHUR H. LOWE. Do the other textile schools have a correspondence department?

Mr. CHRISTOPHER P. BROOKS. No.

Mr. ARTHUR H. LOWE. How many correspondents did I understand you to say you have?

Mr. CHRISTOPHER P. BROOKS. Well, I don't want to give the exact number, but there are several hundred.

Mr. ARTHUR H. LOWE. Do you require that they shall follow a fixed course?

Mr. CHRISTOPHER P. BROOKS. No, they have the option of perhaps four or five courses. It is our recommendation that they should first take simple arithmetic, if they are not already proficient in mathemetics, and continue it until they can work fractions and problems of that kind, but there is no requirement for algebra or trigonometry. There are no restrictions on the later branches. They may take up weaving, spinning or both, or designing, or almost any combination of manufacturing processes.

Mr. ARTHUR H. LOWE. Suppose I desired information in

connection with any particular machine in the mill, could I take up that by correspondence?

Mr. CHRISTOPHER P. BROOKS. Yes. Anyone wishing to do that would have to satisfy the school that they had the necessary elementary mathematical education or pass an examination, and then he can take any class he likes.

The PRESIDENT. I declare this session adjourned.

The session adjourned at 12.45.

## SECOND SESSION.

THURSDAY, OCTOBER 5, 1899.

---

The Association met in Windsor Hall at 4 P. M. Called to order by the Secretary in the absence of the President, or either of the Vice-presidents. On motion of Col. JEROME HILL it was voted that Mr. STEPHEN A. KNIGHT take the chair *pro tem.*

Mr. KNIGHT takes the chair *pro tem.*

The CHAIRMAN. The first paper for the afternoon is Eli Whitney and his Cotton Gin, by Mr. M. F. FOSTER, Milford, New Hampshire.

# ELI WHITNEY AND HIS COTTON GIN.

M. F. FOSTER, Milford, N. H.

Foremost among inventors stands the name of ELI WHITNEY, the avowed inventor of the cotton gin. His invention has withstood the criticisms of practical manufacturers and theorists for more than a century, and it can be said that today it practically prepares the cotton crop for market, and it bids fair to be continued in use for considerable time to come unless some inventive genius can bring out something to take its place which will perform the work as speedily and cheaply and retain the staple unbroken. The manufacturer may grumble and declare that the saw gin is the most destructive process that cotton is subjected to from the cotton field to the spinning frame, yet he is compelled to accept the situation from the fact that no inventor has brought out any other process of separating the lint from the seed that finds favor with the cotton grower, for he seems to be the man to please as it is his business to raise the crop, market the same and get his pay for it.

ELI WHITNEY foresaw what was wanted in his day and went to work and produced it. We say he "built wisely" or that he "built better than he knew," for the test of a hundred years shows him to be an inventor worthy of appreciation. Born and educated in New England, he carried with him to Georgia that spirit of enterprise that has distinguished him among men of genius.

During the past winter the writer visited the spot where WHITNEY made his experiments with his cotton gin. Upon a sluggish stream that is known as Rocky Creek which flows

PHINIZY'S OLD MILL, ROCKY CREEK.

PHINIZY'S OLD MILL,
Rocky Creek, four miles from Augusta, Ga.
Where Whitney's Cotton Gin was first operated.

into the Savannah River a few miles below Augusta, Ga., stands a deserted wooden mill building with its crumbling wooden tub wheel in a decayed wheel pit. Near by is a broken dam and a cane brake which borders upon a swamp where the long flowing moss hangs drooping from the trees. The spot is interesting only as a place where WHITNEY made experiments and operated his first cotton gin. Upon this spot the cotton growers and the manufacturers should alike join in erecting a tablet to the memory of ELI WHITNEY. Only for the invention of the cotton gin has cotton manufacturing assumed the vast proportions that it has throughout the world.

For the following bit of history I am indebted to CHARLES C. JONES, LL.D., author of the *History of Georgia* and other historical works.

ELI WHITNEY was born in Westborough, Mass., Dec. 8, 1765, and after completing his education at Yale came to Georgia with the view of entering into the legal profession. He made his home with the widow of General GREENE, the Revolutionary hero, and as tradition has it, had his attention directed by that lady to the subject of a machine for preparing cotton for the market. In those times the seed was laboriously and imperfectly separated from the lint by hand and Mrs. GREENE seems to have foreseen that important results would follow a speedier process. Young WHITNEY worked out the idea and in 1793 received a patent for his famous gin. His experiments were made in and near Augusta, Ga., and about four miles south of the city is still to be seen the dam used by him to run his works. Sometimes it is said that WHITNEY is not the real inventor of this device but purloined the idea from is original author, the statement being that a citizen of South Carolina constructed a gin towards the close of the eighteenth century and that WHITNEY surreptitiously gained access to his work shop and carried off the plan and constructing a machine, patented it as his own. This story is told with great circumstantiality and the house in which the machine was originally constructed is said to be still standing within sight of Augusta in Hamburg, S. C., on the left

hand side of the road just across the Savannah River bridge. The contemporaneous history of WHITNEY'S times, however, shows pretty clearly that he was really the inventor. The patent was issued to him in 1793 and by act of Dec. 19, 1801 (5 statutes South Carolina, page 424), the legislature of South Carolina purchased from him the right to use his patent in that state for the sum of $50,000.00. The *Augusta* (Ga.) *Herald* of Dec. 30, 1801, mentions the passage of this act and says "In the course of the negotiations between the legislature of South Carolina and the patentee we understand that every satisfactory evidence of the originality of the invention was produced and its principles so fully explained by the ingenious inventor that little or no diversity of opinion existed as to the propriety of making a contract." Now if WHITNEY had really robbed a citizen of South Carolina of the invention it is hardly likely that the legislature of that very state would but eight years after have permitted him as against one of its own people to profit by the wrong. If any question was raised before the legislature of South Carolina as to WHITNEY'S right every satisfactory evidence of the originality of the invention was produced so that there was little or no diversity of opinion as to the propriety of making the contract.

WHITNEY'S right to the invention was further established by act of the legislature of Tennessee in 1806 by the passage of the following resolution: "Whereas it has been made to appear to the satisfaction of the general assembly that ELI WHITNEY, from whom this state purchased the patent right to a machine for cleaning cotton commonly called the saw gin, is the true inventor of said machine," etc., etc.

We draw a veil over the imperfections of the saw gin and as cheerfully as the conditions justify accept the mutilated staple and rejoice that we have even that to be thankful for. But new times demand new measures and every cotton manufacturer will hail with delight the introduction of a machine which will overcome the objectionable features of the present system of ginning cotton.

The manufacturer should continue to urge upon the producer the importance of improved methods of preparing cotton for the market. Every effort made in that direction has its influence and in time will bring about the required results.

The CHAIRMAN. Are there any remarks to be made on Mr. FOSTER'S paper? If so, it will now be in order. If there is nothing to be said, we will take up the next paper on Cotton Ginning, by Mr. J. E. CHEESMAN of New York City.

## COTTON GINNING.

J. E. CHEESMAN, 27 William St., New York City.

I have of late been very much interested in studying the cotton question in all its phases, but more in particular the matter of ginning from its earliest mention down to the present, following the evolution of the handling of the cotton in its primary treatment as it comes from the field. It is interesting to follow the growth and cultivation of the cotton plant which is many centuries old, so old, that we often wonder where it began and how they first treated it to release the fibre from the seed. We find it mentioned in that most ancient digest of law the "Institute of Man," 800 B. C. There cotton is mentioned so often, and in such a way, as to indicate that even then it must have been long in familiar use by the natives of the country. Because of this soft, silky, pure white product of nature, it was ordained that "the sacrificial thread of a Brahmin must be made of cotton, so as to be put on over his head in three strings." In the first book of the Rig Veda, Hymn 105, V. 8, occurs the following expression: "Cares consume me, Satakratu, although thy worshipper, as a rat gnaws a weaver's threads," showing that in that early time the weaving of cotton was not a new art. In the Book of Esther, Chapter 1, v. 6, the Hebrew word *Karpas*, meaning cotton, occurs in describing Ahasuerus' great feast. Herodotus was acquainted with the "wool from trees" as is evidenced by his describing the Cuirass, sent by Amasis, king of Egypt, to Sparta, as "adorned with gold and with fleeces from trees." This is an old, an historic business we are engaged in. And even in that early time they were troubled with steal-

age and found it necessary to pass laws governing the protection of cotton "so that he who stole would steal no more."

The first actual knowledge we have of cotton goods as an article of commerce is obtained from Arrian when he describes Arab traders as bringing cotton goods to Aduli, a port of the Red Sea, which even now receives and discharges its share of the commodity. Columbus found cotton growing in the West Indies, and Cortez discovered it in Mexico. How long it had been growing there we know not, — But how ginned? We are forced to believe it was by hand, the one way of perfectly removing the fibre from the seed. In India, that land of cotton memories, reaching so far back as to seem to run up against the creation, we find the record of the first roller gin, so far as I can discover the first application of mechanical ingenuity to the separating of the cotton fibres from the seed. You will find a picture of this wonderful machine submitted with a description of its workings. Its several parts are as follows:

1st. A three legged stool on which the ginner sits.

2nd. A flat, smooth stone one foot long, six inches wide and two inches thick.

3rd. An iron roller ¾ inches in diameter at the centre, tapering towards the ends.

4th. Two thin bamboo soles for placing under the feet of the operator when turning the roller.

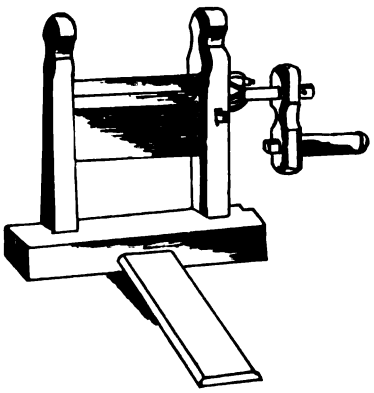
The entire cost of this simple gin was one shilling English money. These gins were operated by women and girls. (Illustration No. 1. Foot Roller Gin.) Its operation as described by W. WALTON, Superintendent of Cotton Ginning Factories in India, in his report to the Bombay Government in 1880, is as follows: "First the cotton is placed in the sun, frequently turned over, and beaten by thin bamboo sticks, so that it may be as loose as possible for ginning. The operator secures her position on the stool, puts the roller on top of stone, roller ends extending over either side of stone, and places a foot on each end of iron roller. Then by partly balancing herself on her feet, still sitting, she works the iron roller backward and forward

with some pressure. She then takes a handful of seed cotton in her right hand and places it under the roller bit by bit, and the motion she gives the roller, pressed as it is on the stone, separates the seed from the fibre. The seed comes out in front, and behind the roller the woman puts her left hand and removes the cotton fibre as it comes away bit by bit and passes it under the stool upon which she is sitting. It will be noticed that the working of this machine keeps legs and feet, arms and hands, all employed together." Crude as this method was, there was hidden therein the germ of the correct principle of removing the seed, that is *by frictional contact between two smooth surfaces having no sharp teeth or cutting edges to tear and break the fibre.* The capacity of the Foot Roller Gin, being but three pounds cotton lint per day, was found to be too small for the ever increasing demand for cotton. The inventive genius of the time after much experimenting produced an improvement in what was called the " India Churka," a roller gin much resembling in its action our ordinary clothes wringer (See Illustration No. 2). Two end pieces supporting two rollers, made of wood or iron, a handle to each worked by two persons, each turning a roller. While one fed the cotton between the rollers, the other pulled the lint off the roller after it had passed through, the seeds being squeezed out in front. The second edition of this machine showed a decided improvement by discarding one handle thereby one operator, and running the two rollers by a cog wheel. This machine produced as high an output as eight pounds of lint per day (Illustration No. 3).

The Bombay Government thought these methods too slow, and looking to America for improvements, they found and introduced the saw gin with some modifications. The Cottage Saw Gin, having but four saws, was run in the homes by hand power, and produced 16 pounds *per hour*, as against three and eight pounds *per day* on the foot roller and Churka gin. After a few years use of the saw gin the Government made an investigation of the work of this gin, and, finding it injured the cotton fibre, decided to return to the earlier method, and *as late as*

NO. 1. FOOT ROLLER GIN.

NO. 2. INDIA CHURKA.



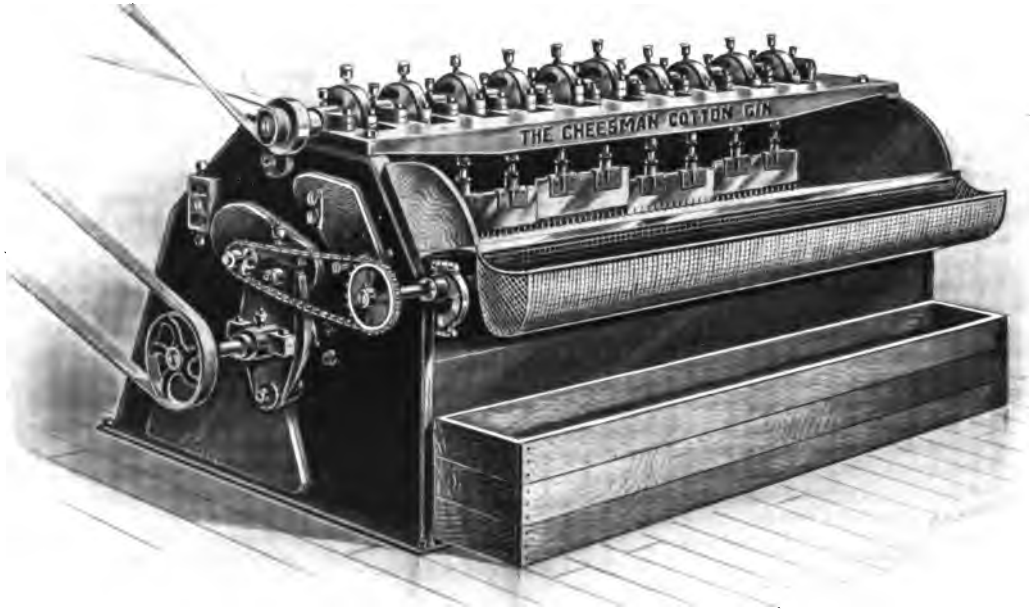
NO. 3. IMPROVED INDIA CHURKA.

1880 *most of the Indian cotton was ginned by their primitive roller process.* The reason is found in an extract from W. WATSON'S report to the Bombay Government in the year 1880. "There is no known machine like the foot roller for the cotton it is adapted to. If only honestly worked, it does absolutely no harm whatever to the fibre, *and this cannot be said of any other appliance.*" In another part of his report he refers to the saw gin in these words: "The use of the saw gin has fallen off so in the last ten years that few are left in India." True, India is not to be compared to this country in matter of progress. Some of the reasons for the discarding of the saw gin there, might not hold good if applied to this country. The cost of labor, the unskilled workmen, carelessness of operatives in handling machinery must be taken into consideration, but we must allow them credit for one thing and that is they refuse to *saw* their cotton, *preferring to gin it slowly but gin it well.* That argument, applied to Egypt as well, is the secret for the large importation of Egyptian cotton by this country. How much of this cotton, gentlemen, would you use in your mills, were it ginned by the saw gin running against time? You buy the Egyptian cotton because it is strong, of good body, lustrous and of long staple, free from gin cuts and waste. It is roller ginned, that is the secret. They put quality before quantity.

In the United States as well as elsewhere, the cotton conscience has become very much troubled the past two or three years. We are beginning to realize the awful conditions surrounding the handling of cotton and the shameful abuses to which it has been subjected, and we blush as the full force of our neglect comes home to us. However, most of the improvements the past two years have been in the baling and compressing of cotton, and no man will deny the great need in that direction. Though I never bought or handled a single bale for profit, I am glad to see these changes, and to find, in place of the ugly bale, one so neat and symmetrical that our country may be proud to ship it to foreign ports. But the improvements cannot stop with a compress for this is the secondary factor in the

cotton world, not the primary. The *ginning* is where you are to look for improvement in your staple; the best compress in the world cannot add a single atom to a cotton fibre, cannot mend the break nor heal the gaping wound. Diagnose your cotton disease and you will find it always contains the microbe of bad ginning. If any improvement in the ginning of cotton is introduced in this country, it will come from the spinners demanding better fibre. Is there any possibility of the saw gins giving you this uninjured staple? I think you will agree with me, in the light ot all the scientific research upon this subject so recently presented before your Association by Mr. EDWARD ATKINSON and Prof. CHARLES L. NORTON, as well as from the practical proofs so ably introduced by others, that this is an impossibility. You must look to the roller gin. Cotton ginning is more of a business now than it has ever been before, seperate and distinct from the growing of cotton. By the sub-division of the large plantations into numerous small farms, there have sprung up in the South Central ginning plants, one to so many farms growing cotton. In this fact we find one reason why you are getting inferior cotton today. Competition in ginning the farmers' crop has caused the money charges for this work to fall from $5.00 a bale to $2.00, and, in order to make money at this price, the saw gin is forced to the highest possible speed. The planter pays dearly for this when the buyer samples his cotton, and the spinner year by year finds cotton growing poorer and poorer.

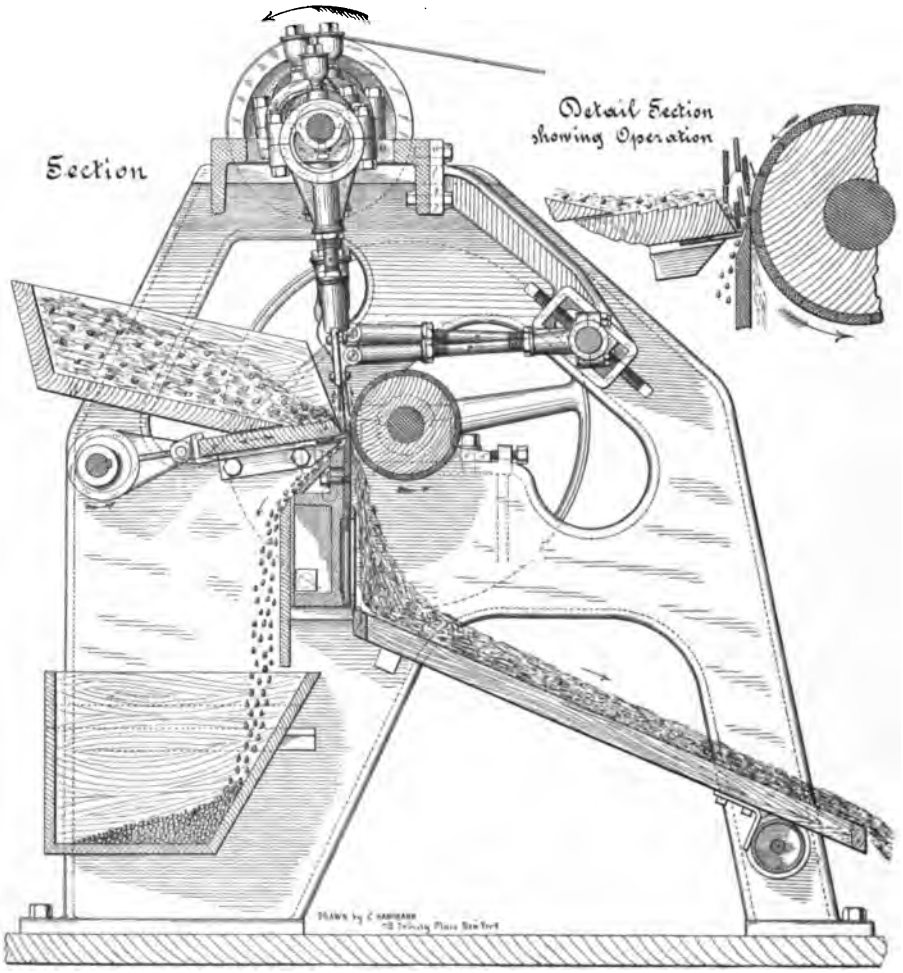
When Mr. C. P. BROOKS in his recent work on Cotton says, "The unfortunate American principle of sacrificing everything to cheapness of production in ginning cotton," he comes very near the truth, and we find a cry going up from England and America alike over the deterioration of American cotton. Is it that the farmer grows an inferior staple? We can hardly find proof to substantiate such a claim, and therefore must fall back upon the one fact we know to exist, namely the destructive methods in ginning and handling cotton. The cure is not to come from the planter so long as the spinner is satisfied. When




NO. 4. THE CHEESMAN ROLLER GIN.

of a roller, a stationary blade and a movable stripper and in 1854 he secured a patent covering these features. Today this gin, with virtually no improvements, is in use in the Sea Island field, as well as in India and Egypt. It seemed an original idea and yet "there is nothing new under the sun." Go back with me to Illustration No. 1 — The Foot Roller. There we have the flat smooth stone as the guard, or part to hold the cotton fibre securely, the iron roller in place of our leather roller and the fingers of the operator representing our movable blade or "stripper." And it is the "stripper" which has been the principle obstacle to the success of roller ginning. A long blade sharp at the edge, running up and down in a straight line, in close working contact with a stationary surface, passes the exposed surface of the roller so closely and goes beyond the edge of the guard so far that the feed is shut off half the time. Such a stripper, going up and down in the same plane, carries the cotton seed and fibres with it and on the downward stroke rubs the cotton on the surface of the guard, causing abrasion of the staple and often striking fire. The one piece stripper such as is employed in these gins cannot be made longer without losing its rigidity, therefore, the size and capacity is unalterably fixed.

The Cheesman Roller Gin we believe overcomes the faults in the present roller gins. Its capacity is two or three times greater and there is absolutely no danger of fire and no injury to the staple. This roller gin works upon a new principle, that of a divided stripper, the edge of which is blunt instead of sharp. The stripper blades are fixed upon the driving shaft in thirds or fifths, traveling independently of each other, thereby destroying the vibration and causing the seed to leave the cotton more quickly than is possible by any other method. These strippers by means of *an elliptical motion* handle the cotton so deftly that the result closely resembles the work of *hand ginning*, and herein is the secret of success, ginning cotton quickly, with absolutely perfect fibre, free from dust and trash. By referring to illustration No. 5 you will see that the working of the stripper edge is that of an ellipse. Starting from the highest point it




NO. 5. CROSS SECTION. CHEESMAN GIN.

describes the beginning of an inside curve as it approaches the cotton held by the roller, gets back of the seed, and, as it nears the guard, continues its curve downward and outward, taking the seed with it in a rolling motion. It is this outward motion, away from the guard, that prevents the rubbing of the cotton fibre against the hard surface of the guard, to its certain injury and the breaking of the seed. The fibre coming from this gin is straightened by the operation, having no twists or kinks. The adjustment of the speed of the roller to the speed of the strippers has been carefully worked out to this end.

The construction of this machine is such that any size of gin can be furnished to meet the requirements of capacity and thus the main objection hitherto made against roller gins is overcome. I have been told that the spinners desire cotton to come to them in a state as nearly like that of the cotton when picked as possible. This we accomplish, as no brush, cleaning device, or condenser is used, the cotton coming from the gin in a bat ready for the press. This may seem to you a fairy tale but we are prepared to show the results of the most careful and searching examination of cotton experts in proof of our statements, and we shall be glad to furnish you ample opportunity to make further tests yourselves in your own mills. We claim for the Cheesman Gin utmost simplicity in construction and running (so that skilled mechanics are not essential to its operation), automatic feed, a saving of labor, great saving in horse power, large increase in quantity with perfect quality, clean seeds (doing away with cotton linters), and safety from fire. The gin has had its test in the field and is, therefore, more than a suggestion, it is a fact. They are being manufactured and this Fall will find them distributed through the cotton states where the longer fibres grow, and ginning, we hope, enough to have the fibre tested by such spinners as care to try it. We feel at last that we are coming to better things in the world of cotton. If the spinner demands it, he can have perfect lint, for the means to obtain it is at hand.

The burden of my paper, gentlemen, is to call your attention

to a comparison of the conditions of cotton fibres — those ginned by a saw, mutilated, with a sixteenth or perhaps a half cut off, and those ginned by a roller which cannot commit this injury, but must leave the fibre whole. These are facts, and you know better than I the difference in value between this broken fibre and that which comes to your hands with all the length and strength imparted to it by nature.

Mr. ARTHUR H. LOWE. I would like to ask the gentleman how the product of the roller gin compares with the product of the saw gin?

Mr. J. E. CHEESMAN. Do you mean in quantity?

Mr. ARTHUR H. LOWE. Yes.

Mr. J. E. CHEESMAN. Well, from a half to one-third less. We are now making them in three sizes, 48-inch feeding surface, 60-inch and 80-inch. We can make them as wide as this room, but we run those 60-inch gins on two and a half horse power when it is running full, whereas a saw gin producing a third more than we will produce takes, I believe, ten horse power, so that there is a saving in horse power.

I would like to say right here that before I leave the convention I would like very much to get the names of any of the spinners who would like to test cotton ginned on the Cheesman gin. I will see that they have it, because we are now distributing gins in Texas, in Mississippi, in Arkansas, and we expect to in the Carolinas. The manager is now in the South distributing the gins, and I want an actual test because, if I am wrong in this thing, I want to know it.

Mr. ARTHUR H. LOWE. What would be the product of the

60-inch gin you describe, as requiring two and a half horse power—what would be the product in quantity for ten hours?

Mr. J. E. CHEESMAN. It would be four bales. The capacity of the saw gin is something very hard to get at. If a man runs a saw gin at its greatest speed, he will get out a great many more bales. The slower a saw gin runs, the better the quality, and the faster it runs the poorer the quality. The saw gin was not built to run producing ten bales a day; that is the highest possible speed you can run it. A 70- or 80-inch gin will produce more. In the South they run the gins so fast in order to get the business, that they don't care for the state of the cotton. What they are after is the toll, and they get it, but if a saw gin is run in the way it should be run, the quality of the cotton would be very vastly improved, but the capacity would be decreased per day.

Mr. LOUIS SIMPSON. Unfortunately for myself, we have to use a great deal of a cotton that ought to have good staple, and this year especially I am told that good staple cannot be purchased. I think that anything that will give to the trade a good staple merits encouragement, and therefore I am very glad indeed to try as many bales as our friend will send me. I have seen a good deal of cotton in the last few years utterly spoiled by being forced through the ginning machine in a careless manner.

During the last few years I have had more trouble fighting with the cotton factors on the question of bad cotton than anything else. Here in Canada we are in the backwoods, and we have trouble sometimes with help, and sometimes with machinery, but I have had far more trouble in trying to get my cotton right.

If I make my goods wrong, when they go to the wholesale trade, the wholesale trade will say "Those goods are not right." Well, I can't go to them and tell them that the cotton ginners have spoiled the cotton down South. They would say "We don't care for that, we want to have our goods right."

We find that we do not have the same trouble when we get

our cotton from Egypt. We get the cotton year after year from Egypt just right. Now why can't we get the same satisfaction when buying in the United States? Why can't we be as sure of getting the right staple down in Mississippi as we do from Egypt? Surely our friends down South are as clever as the poor Egyptians, and it has always been a mystery to me why we cannot get the southern cotton right. I think it must be because they somehow have a wrong system down there. If this be so the sooner they get the right system, the better it will be for those in this country and in your country who are interested in the manufacture of cotton goods, especially of goods manufactured for fine yarns.

The CHAIRMAN. I think it has been a source of very much annoyance during the past year, the bad manner in which cotton has been ginned. I know that we have suffered more, perhaps, in the last year than in four or five years previous, so that it does not look as if they were moving in the right direction. What the remedy may be is a conundrum.

Mr. J. E. CHEESMAN. There is something that I did not care to put in the paper, but since the paper has called for some discussion, I may say that a practical test has been made on the same grade of cotton ginned by the most improved saw gins now running and the experts—the buyers, the practical men—have in several cases, given from one-half to two and three cents a pound more for the staple of the roller gin cotton over the saw ginned cotton.

Now if that is so, as soon as the planter learns that fact, and they can figure as well as we can, then I think that there will be enough of these roller gins introduced to at least give you a chance to make a fair test, but we are not waiting for that. Our company represents enough financial strength to carry it through. We mean to put our gins in the field now, in these different localities, especially where the fine grades grow, and I want to carry away with me an expression of willingness

on the part of several of you to test this product, and give it a practical test in your mills, and if it is better, I will expect you to buy some of it.

Mr. ARTHUR H. LOWE. I would like to ask the gentleman the cost of this gin, compared with the cost of the saw gin?

Mr. J. E. CHEESMAN. They cost five hundred dollars. The price of the saw gin, condenser and cleaner is three hundred dollars.

Mr. JOHN E. PREST. I would like to ask the gentlemen if the same grade of cotton comes from the saw gin as the roller gin. I would like to see samples of the roller gin cotton, and also from the saw gin while we are here.

Mr. J. E. CHEESMAN. I have no samples here.

The CHAIRMAN. If there is nothing more to be said on this subject, we will pass to the next paper, The Round Bale, by Mr. LOUIS SIMPSON of Valleyfield, Quebec.

## THE ROUND BALE.

Mr. LOUIS SIMPSON, Valleyfield, Quebec.

It is not my intention to weary you with a long dissertation about the round bale. More eloquent men than myself have on different occasions vaunted in no unmeasured tones its merits, until we have almost been led to believe that the adoption of the round bale was the panacea to all the ills that the cotton trade have to bear because of its numerous sins.

It is not my intention to try to dispute the admitted fact that the present system of baling is defective, and might be with advantage improved. My motive in writing this short paper is rather to strike a note of alarm, lest the trade, in seeking to help along admittedly needed improvement in the make up of the American cotton bale, "jump out of the frying pan into the fire."

Granting that any improvement which lessens the cost of manufacture is of beneficial interest to the trade as a whole, (yet any saving made by the adoption of the round bale may, under certain possible conditions become "small by degrees and beautifully less,") such saving is not of so much importance as the ability of purchasing cotton of a quality of staple suitable to the requirements of any given mill.

The reduction of price, if any, might be of advantage to the consumer and, perchance, indirectly to the manufacturer, but to the latter only through any possible advantage accruing from an increased consumption of the goods he produces, owing to the lessening of the cost of production. Competition amongst the mills would neutralize three years out of five, any advantage

promised or expected through the adoption of the so-called round bale and its kindred bales.

Regarding the subject selfishly, were all the bales of cotton produced upon this Continent put up in round bales, the trade would not be directly a cent better off. On the other hand, the question of sampling such bales has never, to my mind, been satisfactorily arranged for. An honorable gentlemen who did this Association the honor to address it last year, asserted that the men running the ginneries were cotton experts and were competent to take such samples and also to class out the cotton. I had the impudence to doubt the honorable gentleman's assertion. Since then I have been able to make inquiries into the matter, and the outcome of these inquiries is the *raison d'etre* of this paper. In large sections of the South, the owners of the ginneries are of two kinds: A. Those owned by the proprietors of large plantations who ginned therein their own crop, and also any cotton their neighbors might sell or entrust to them.

B. Public ginneries, situated at some central point, the proprietors of which gin the cotton grown by the public in that neighborhood—often ginning cotton grown over a wide area, containing all qualities and description of soil and cultivation; the cotton purchased possessing staple short and staple long, and of quality good, bad and indifferent.

The gins worked in the ginneries under Class A are superintended by the manager of the plantation in which their ginnery is situated, this gentleman's chief qualification being his capacity to manage colored labor, that is, to make them work, and who never pretends to be an expert judge of cotton. Such managers are usually paid $50 per month with their board.

The ginneries under Class B are usually owned by the proprietor of a general store, and are run in connection with the store. It is usual for the owner of the store and his clerk to take turns about in the superintendence of the ginnery. As the usual business knowledge of a general store keeper in the country parts of the South consists in a knowledge of how to buy molasses, etc., and whom to trust, and how to collect the debts

owing them, it is evident that they are not competent to act as cotton experts. In fact, the gin owners under both classes do not sample the cotton which passes tnrough their hands. This duty is done by the commission merchant to whom they consign the cotton for sale, and if perchance the cotton is sold at the ginnery by the owner to some itinerant cotton buyer, the buyer samples, classes and grades the bales himself, and pays the seller according to his conscience or according to the ability of the seller to make a good bargain or otherwise. From all I hear, the conscience of itinerant cotton buyers is of a quality extremely elastic. This may perchance explain where some of the large dividends made down South come from. Providing that which I have stated be correct, it is evident that no sampling, to be of any value, can be done at the ginneries.

I am also informed that the owners of the round bale cotton have, during last season, declined to permit their bales to be sampled by buying factors, on the ground that sampling spoiled the bale. If cotton has to be purchased without sampling, or upon the samples taken by persons who are not competent to take such samples, then verily will the trade, by adopting the round bale, "jump from the frying pan into the fire."

But again, the saving between the old and the new method may be absorbed, and even more than absorbed, by the profits demanded by certain large corporations with huge—I will not say inflated—capital, and by the taxes placed upon the new machines by the different States' governments.

I am given to understand that at least one State has decided to tax each one of these new machines as they even now tax the big compresses. A tax which the big compresses would not feel, would be a very serious burden to a small ginnery. What one State has done, or is going to do, all the cotton states may do, as the government of these States is in the hands of the farming classes, who dearly love to tax the capitalists, especially those who make it their boast that their capital runs into the millions.

To sum up the present position of affairs, I would claim that

at the present it would appear that any saving caused by the adoption of the round bale is likely to go into the pocket of some one else, rather than that of the manufacturer, whilst the manufacturer runs the risk of being placed at the mercy of gigantic corporations, whose interests are not his interests, or else the manufacturer will have to buy his cotton after the style of the Irishman who bought "a pig in a poke".

The CHAIRMAN. The round bale system has engaged the attention of this Association for the past two or three years, and is a matter of considerable importance to the Association. Any remarks in reference to that bale or to Mr. SIMPSON'S paper will now be in order.

Mr. JEROME HILL. Gentlemen, I assure you it was not my intention to take part in the deliberations of the New England Cotton Manufacturers' Association today, but the high esteem in which I hold my good friend Mr. SIMPSON of Valleyfield, to whom I am indebted for kind hospitalities, impels me to set him right in the erroneous position he takes in his fears of the round bale system becoming detrimental to the spinning interests.

He is wrong about the sampling. This question has been well considered, and it is now a known fact that the Planters' Compress, known as the Lowry system, makes a bale of cotton that is perfection in its protection of buyers and consumers. Really, it is far ahead of the old square bale in this respect. It is impossible to hide a fraud, or mix cotton in these bales. You have only to strip the bag covering, and see every layer of cotton from end to end, and compare it with samples extracted from both ends, and be convinced. I assure you, gentlemen, that this is one of the strong recommendations of this system. To prove this, allow me to say that the president of the Memphis

Cotton Exchange, Mr. C. C. COWAN, whom today you have elected an associate member of your Association, is not only an endorser of this bale, but is in accord with Mr. JOHN M. PARKER, president of the New Orleans Cotton Exchange. Both of these gentlemen are recommending this process to the cotton producers of the great Mississippi valley, and are directors of the Tennessee Planters' Company, and both are introducing this cotton to the markets of Europe and America.

I am pleased to state that our steamship lines have recognized the great saving of this system in space on their vessels, and are giving us corresponding reductions in freight rates, and I do not hesitate to say that this is the first and only *uniform* bale of cotton yet presented to the trade. Every bale is eighteen inches in diameter, and varies only from one to two inches in length.

As to density of this cotton in packages, we can, without change of machinery, make the bales thirty, forty or fifty pounds to the cubic foot. We are covering now with cotton bags, which should meet the approval of the man who produces cotton, and the man who makes the cloth from which said bags are made.

The reductions in freights and in fire insurance is not only gratifying, but it is an assurance that our great trunk lines of railroads will speedily follow, and as we are loading their cars to full carrying capacity, the same as if loaded with iron, you will be the beneficiaries, and the New England and Canadian cotton mills will, in practical results be, say, one-half the distance nearer the cotton fields of the South, and will, in this respect, equalize the cost of manufacturing cotton on the American continent.

I wish to say, Mr. President and gentlemen of the Association, that it is a great pleasure to me to meet those who manufacture and market the product of our cotton. Please remember that you and I are on different lines, and come from the extremes in the cotton industry. My people produce cotton and issue bonds; the New England Cotton Manufacturers' Association buy and spin our raw material, and clip the coupons. However, we are not jealous, and it is a pleasure to see your great pros-

perity, and we hope it will continue for years to come, and that we of the South may also participate in the same.

Several years ago at our meeting in Atlanta, in discussing the American cotton bale, I told you that we were on the eve of a revolution. I hope you will bear me out when I say that this is now an established fact. The old system of baling cotton is almost a thing of the past, and without making any special claims to the system I am endorsing, I can bid you look forward to receiving your cotton perfect in packages, perfect in condition, free from false packs, and free from sand and dust. Whilst you have made most rapid progress in the development of your machinery, you have not gone ahead of the South in the wonderful improvements that have been made in the gathering and marketing of the cotton crops during the last three years.

Now, if the railroads will be just—and I have always found them so—and will give to cotton the reduced rates that our improvements justify, the results will be to the advantage of the spinners, the cotton producers, and not at all to the detriment or injury of the railroads.

Mr. WILLIAM C. LOVERING. (Added since the meeting) Mr. SIMPSON in discussing the merits of the roundlap bale doubtless means to be perfectly fair. I, therefore, desire to make a brief reply in the same spirit. He admits at the outset that the old method of baling and handling cotton is defective, and so it must be that he, with the rest of the world, is ready for some improvement. Does the American Cotton Company's roundlap bale fill the requirements? He thinks not, and proceeds to sum up his objections as follows: He says, "Were all the bales of cotton produced upon this continent, put up in roundlap bales, the trade would not be directly a cent better off." This may be said of any invention or improvement in any department of the industrial world. This proposition is so out of line with the progressive spirit of the age, and so at variance with the enterprise of the gentleman himself, that it is doubtful whether he expects a serious answer. Acting upon this principle he would never avail himself of any

of the products of human ingenuity, no matter how valuable or well established they might be. He says, "The question of sampling has never been satisfactorily arranged for." His attitude of interrogation toward the roundlap bale seems to be based upon the assumption that no dependence is to be placed in the samples which accompany roundlap bales, because ginners in the South are not expert classers of cotton. This is a fair inference from his disparagement of cotton ginners and his remark, that, "If cotton is to be purchased without sampling, or upon samples taken by persons who are not competent to take such samples, then verily will the trade, by adopting the round bale, 'jump from the frying pan into the fire'". Either Mr. SIMPSON is not candid, or he has not taken the trouble to inform himself. Roundlap bales are not sold without being sampled, and the competence or the incompetence of roundlap ginners as cotton classers, has nothing to do with the correctness of the samples by which roundlap cotton is sold. Without admitting the truth of Mr. SIMPSON'S sweeping assertion, that all ginners are densely ignorant of the fundamentals of their business, roundlap ginners might as classers be as ignorant as he thinks all ginners are, without in the slightest degree affecting the correctness of roundlap samples.

The sampling of roundlap bales is a purely mechanical operation. While the bale is being made, an uncompressed sample 10 x 24 inches and about 4 inches thick is taken out and divided in two pieces, each about 10 x 12 x 4 inches. These samples are tagged to correspond to the tag number of the bale, one of them is sent to the American Cotton Company, and the other is delivered to the owner of the cotton. As none but dry, clean, merchantable cotton of even grade is allowed to be put up on roundlap presses, and as the bat of which the bale is formed comes directly to the press from the gin, through the lint flue, it is evident and indisputable that the samples taken, correctly represent every particle of cotton in the bale. When the ginner has made, sampled and correctly marked the bale, his function ends so far as the sampling is concerned, unless he is the owner

of the cotton. Roundlap samples are classed by the American Cotton Company's classers and the cotton is purchased by the American Cotton Company upon their classification, subject to arbitration in case of disagreement as to class between the buyer and the seller.

However incredulous Mr. SIMPSON may be, it is a fact that the American Cotton Company's system of sampling works perfectly. Mr. SIMPSON should know that the American Cotton Company has sold hundreds of thousands of bales of cotton bought by these samples with fewer disagreements and reclamations, than would have accompanied a square bale business of the same magnitude. New England and European spinners were quick to see the advantage of the roundlap bale. Last year roundlap bales met with a ready sale on the Continent, and this year the demand is enormous, and altogether beyond the company's ability to supply cotton. Not the least of the reasons for spinners' preference for roundlap bales, is that they know that every pound of cotton in every roundlap bale, is exactly what it is represented to be, and that in case of error the American Cotton Company's guarantee secures them against loss.

As for Mr. SIMPSON'S information that the owners of round bale cotton last season "declined to permit their bales to be sampled by buying factors," it is likely correct as to some local buyers. There are men in the cotton states who go about sampling every bale they can lay hands on. Owners of roundlap gins properly refuse to permit their bales to be cut open out of curiosity by men who have no intention of buying them. But to no one who is entitled to do so is the privilege denied of verifying the original samples in any way that may seem to him proper—by taking off the head, cutting open the side or removing the covering and unrolling the bale.

He says that, "The saving between the old and the new method may be absorbed and more than absorbed by the profits demanded by certain large corporations with huge capital and by the taxes upon the new machines by the different states' governments."

This is an assumption that seems to me unfair and unworthy of the gentleman's candor or intelligence. It begins by practically admitting the economies of the new method and then implies that the advantages will all accrue to a large corporation and not to the users of the roundlap bale.

Now in the first place, the American Cotton Company is not a corporation with a huge or inflated capital. It is not the only company in the field making a round bale. In the second place those having charge of the company realize that success lies in the application of correct business principles to all its affairs. The savings by its system are divided with the producer and the consumer and the company cannot hope for permanent success on any other terms. If the gentleman will take the pains to investigate the methods of the American Cotton Company he will find that while it is working for a profit it does not violate the fundamental rules of business. It gives value for value received, and will never "kill the goose that lays the golden egg".

Referring to the adverse action of state legislatures against new machines the American Cotton Company welcomes the fullest investigation of its methods and does not shrink from bearing its proper proportion of all public expenses. Commonwealths are in the main just, and will not long continue to tax any invention or improvement simply because it is an invention or improvement. A state cannot afford to levy an unjust tax.

Finally Mr. SIMPSON closes with a statement which breaks the force of whatever argument he may have previously made. He says, "The manufacturer runs the risk of being placed at the mercy of a gigantic corporation whose interests are not his interests or else the manufacturer will have to buy his cotton after the style of the Irishman who bought a 'pig in a poke'".

Here then is the substance of his fear embodied in the shadow of what he pleases to conjure up as a gigantic corporation throttling the manufacturer. Had he confined himself to pointing out defects in the bale and urging these as objections, his paper would have been entitled to consideration as an argument, but

by this statement he virtually admits that the roundlap bale is going to become so desirable that manufacturers will be obliged to buy it. Surely what else can ever compel its use.

The simple facts are these. The roundlap bale must stand or fall on its merits. If it is a good thing it will stand, no matter what may be said against it. If it is a bad thing it will fall, and no amount of writing or talking can bolster it up or make it a success.

As the spindle superseded the distaff;

As the power loom superseded the hand loom;

As the railway train superseded the old stage coach, so it is absolutely certain that some new and better system of baling cotton, is bound to supersede the old clumsy and wasteful methods that are already under condemnation.

One word for the American Cotton Company. Its purpose is to study the needs of the manufacturer; to give him his cotton in as clean, compact and perfect form as possible, and directly in line with the first operation at the mill.

It aims to improve its bale year by year and to this end invites the co-operation of the manufacturers by making all reasonable criticisms and pointing out all remediable defects.

The roundlap bale has passed the period of probation. It has already established itself in the markets of the world. It no longer has to seek customers. The manufacturers are ready buyers, and it has come to this, that the manufacturers who use the roundlap bale cotton have such manifest and absolute advantage of those who use cotton in any other form that the difference constitutes a substantial addition to their profits.

President CLARKE here entered the room and took the chair.

The PRESIDENT. We have a paper on the Dederick Bale by Mr. W. H. PERKINS, of Boston, Mass. Perhaps before we go further into discussion of this matter, we will listen first to Mr. PERKINS' paper on the Dederick Bale, in order to consider the general subject of improvements in the baling of cotton.

## THE DEDERICK BALE.

W. H. PERKINS, Boston, Mass.

Much has been written and a great deal has been said during the past few years about improved methods for baling cotton. That improvements were necessary, no one will question.

The slow screw press abandoned for baling hay almost three quarters of a century ago, is still used for baling cotton into absurdly grotesque and ill looking bundles. Some improvements have been made, and the round bales being the first to be brought prominently before the people, have found more or less favor; but there was still room for improvement, as length of staple in cotton is value, and every single fibre has scarcely perceptible strength; hence, any process of baling that puts strain on the fibre, like pressing it by movement against rollers or slides must break innumerable fibres, and proportionately damage and depreciate the value of the cotton, although this may be imperceptible to any but an expert; moreover, any foreign substance that may be in the cotton is thus crushed and ground into the cotton so that it must be difficult to separate. It follows that to fully preserve the fibre, and to pack without damage, the cotton must be confined in a box or case when subjected to pressure, and the pressure must be a force, and traverser face with immovable contact on the surface of the cotton being pressed, and the bale must be formed the first operation, without further reducing under a compress.

I exhibit here a bale, quadrilateral in shape, put up under these conditions, unexceptional in all respects, and the neatest bale ever produced, being smoothly and evenly covered and

bound, and of just the right size and form to handle and store well without waste room, the press doing all the work, even to covering and binding the bales. The covering, if made of heavy cloth, will hold without the bands. The bales may be repressed if desired with better results than any other bales. We have here four bales of different sizes, density and weights. A bale weighing 100 pounds, one weighing 200 pounds, one weighing 250 pounds covered with light burlap and banded, another bale weighing 100 pounds and covered with a light casing of steel for full protection against fire or water. We can cover any size bale in this way up to 500 pounds. You will note that the bale weighing 200 pounds and the bale weighing 250 pounds are of like dimensions, the difference in density making the difference in weight. We can furnish you bales of any density, and maintain it, or any desired weight from 100 pounds to 500 pounds. The burlap and bands on the 200 and 250 pound bales weigh three pounds.

In pressing the bale we cause a ridge to be formed, from the top to the bottom of the bale, from which samples can be drawn, showing the grade of every layer or lap in the bale. If desired, a sample can be drawn from between the bands the same as from the old style of flat bale. By standing the bale on end, and cutting the bands, the cotton will open out in laps which can be readily thrown into a pile or on the picker direct if desired, leaving the burlap in one whole piece for further use, as it is confined only by the bands and the ends tied or sewed together. These laps are pressed into the bale separately, not squeezed down all at once, as in the old compress, hence, they open out without any labor being necessary. The cotton is pressed so as to cause the least possible injury to the staple, the process being to push the cotton into a steel chamber, against a solid head, and as it is ejected from the chamber, the burlap and bands automatically cover and bind the bales. These bales measure 18″ x 24″ x 24″ in the chamber, and 18″ x 24″ x 28″ out of it, or seven cubic feet. It is plain that this bale will take much less space than any round bale of the same weight, and we can pro-

duce them as rapidly as any battery of gins can deliver the cotton. We can easily produce a bale weighing 200 pounds, all covered and hooped, every two minutes, and by a simple method of weighing the cotton before baling, we can give you any number of the same weight, so that there could be no raising of the weight in invoices by the stroke of a pen, as is often done with cotton shipments of irregular weights; and another advantage which I am sure your clerks will appreciate is this, that invoices can be made for the total weight, the detail being unnecessary, you would know at once, when looking at your invoice if you had bought 100, 200 or 250 pound bales, whether the weights had been raised, or a clerical error had been made; and in making claims for loss in weight the same making of detailed weights would be done away with; and again instead of weighing each bale when it arrives at the mill, you can weigh it in the car, saving time, labor and expense all around.

To sum up, our claims are substantially as follows:

A bale which will command the lowest freight rates; a bale which is easy to handle, and in this respect our 100 to 125 pound bale should meet the wants of small consumers, especially; a bale which has the least possible injury done to the staple; a bale which will stand fire or water, as well as any bale, and if you want an absolute fire and water proof bale, we can supply you, and it is just as easy for us to push the cotton into a steel casing, as into a burlap; a bale which opens up in layers without physical effort, with the staple laid smoothly, all in the same direction. There is no twisting or grinding of the staple in this bale; a bale which can be sampled and examined, as no round bale can be, the sampling ridge from top to bottom being a perfect mode for detection, and consequently, for prevention of mix-packing; a bale which will store the largest amount of cotton in a less space than any other bale in the world; and lastly, a bale which has been praised by every Southern shipper who has seen it, and many of the largest ginners in the South are anxiously waiting for us to place our presses in their hands.

As the press for making these bales is not pertinent to the

present subject, I will not enter a description of it but will state that the press can be seen in operation at the plant of the Dederick Compress Co. at Albany, N. Y., and we would be pleased to operate it at any time for the edification of any person interested to see it.

The PRESIDENT. The question of the manner of baling cotton is open to the Association for discussion. I presume the gentlemen who have read the papers on the different kinds of bales are ready to answer any question we may ask them, or listen to anything you may have to say regarding the matter.

Mr. STEPHEN A. KNIGHT. I understand that Mr. HILL is connected with the company interested in putting up square bales and the Lowry bale and was formerly interested in the company that put up the American bale. I intended to ask him which he considers best, but that would be superfluous. The question I want to ask is, what is the difference in the cost of baling between these two bales—which of the bales is cheaper —how much difference would there be, both being covered with the same material?

Mr. JEROME HILL. I should think it would be very little cheaper, both bales being the same size and covered with the same material. It would take about the same amount of cloth to cover them.

Mr. STEPHEN A. KNIGHT. Which of the two bales will cost the least money to put in shape for the market?

Mr. JEROME HILL. I think the Lowry bale is less costly, and it has other advantages, but as to the cover, I don't think there is very much difference.

Mr. STEPHEN A. KNIGHT. The point I want to get at is, which costs the least money to get it ready for market?

Mr. JEROME HILL. The Lowry bale.

Mr. STEPHEN A. KNIGHT. Then the Lowry bale could be sold for less money than the lap bale, with the same profit to the producer?

Mr. JEROME HILL. Well, large consumers think that the Lowry bale is the most advantageous.

Mr. STEPHEN A. KNIGHT. The point is, which costs the least money to produce it?

Mr. JEROME HILL. Well, the Lowry bale costs less.

MR. LOUIS SIMPSON. Mr. President, I do not think we need bother ourselves about which costs the least money; what we want, as spinners, is to have cotton sent to us so that we can spin it. If cotton cannot be produced at cost price, it will be produced all the same, and if it is produced it will be baled. What we need is to have a bale that we can sample, and so know what we are buying. I know for myself, and other spinners know it, that unless we are sure of what we are buying, unless we can sample the bales properly to see what we are buying, unless we know that we are getting the staple that is required for our special trade, we cannot retain that trade. Unless we get the cotton suitable for the goods we are making, we had better go out of the business.

I have no feeling at all for or against the round bale, the Lowry bale, or the square bale; all I want is to have the cotton come into my place in a form that I can sample it easily, I don't care whether it is round or square, so long as the people I employ to sample cotton for me, can sample it and will see that I get the cotton I want.

I do think that every spinner who is making fine goods will say the same thing. It is the greatest trouble we have here on this

continent, and I am speaking now from experience—I used to buy cotton in Liverpool, England, and I speak of an experience of some years, I say it is the worst trouble we have here on this continent, to get for fine goods the right kind of staple, not only for today or tomorrow, but tomorrow and the year after. If the people in order to save money in freight, or warehousing, are going to make sampling more difficult, it is going to make it more difficult for manufacturers to produce fine goods equal in quality to imported goods.

This square bale here, is one that pleases me, because you can sample it, and I don't care a snap what the cotton costs so long as I do not pay more for it than my competitors do—the cotton may be cheap or it may be dear—but if I can't get the right cotton, the right staple, then I can't make the right goods, and my customers will not place their orders with me.

Mr. STEPHEN A. KNIGHT. I quite agree with Mr. SIMPSON in regard to the quality of the cotton, but I had a curiosity to know, or rather I was interested to know, the difference in the cost of the various kinds of bales. I had intended to push my question further, and ask the representative of the Dederick bale what the proportionate cost of that would be, in his opinion, as compared with the other two bales.

It is evident to every one that we want the best cotton, and we want to get at the quality of it when we purchase it, but I take issue with Mr. SIMPSON when he says it does not make any difference what it costs. It does make a difference. We want the cotton so that we can sample it, and then we want it at the lowest cost we can get it, provided we get the same grade of cotton. My object in asking these questions is a matter of interest and curiosity to learn which of these bales could be put on the market for the least money, other things being equal.

Mr. LOUIS SIMPSON. Mr. President, I think our friend, Mr. KNIGHT, has rather missed my point. Suppose I am competing with Mr. KNIGHT, and he pays ten cents for his cotton and

I pay ten cents, what does the price matter — we are both paying the same price. Of course it is a well known fact that the cheaper you produce your goods the more you will sell, but at the same time if we are both paying the same price, the price is not of GREAT importance; but if we don't make the goods right, if Mr. KNIGHT makes his goods badly, and I make mine perfectly, why, I take the orders, and Mr. KNIGHT gets left.

Mr. STEPHEN A. KNIGHT. Mr. President, what I meant to say was, that if I got the same quality of cotton from the Lowry bale for one dollar a bale less than it costs for the lap bale, and everything else was equal, I would certainly buy the Lowry bale. I wanted to ask what the cost of baling was without regard to sampling; the question of sampling comes in afterwards.

Mr. JOSEPH M. DUNHAM. It seems to me that the point the two gentlemen differ on is that he wants to get cotton that is all right, and has not been injured. That carries us back to the gin.

Mr. STEPHEN A. KNIGHT. That is not the question that is before the house.

The PRESIDENT. The question which is before the house is the cost of putting up these different bales.

Mr. JOSEPH M. DUNHAM. I don't suppose whether it is in a round or square bale makes any difference in the quality of the cotton. You put the same cotton into a round bale or into a square bale, and I can't see that that would make any difference as to the quality of the cotton.

The PRESIDENT. There was a claim in Mr. PERKINS' paper that the cotton would not be injured so much by putting it up in his way, as by some of the other methods.

Mr. LOUIS SIMPSON. Mr. President, I think my friend Mr. KNIGHT does not quite see my point. The cotton may be

good or it may be bad, but if I am buying that cotton, I want to sample it. If I buy cotton that I have sampled, and the cotton is bad when I buy it, I know what I am doing; but if I cannot sample the cotton, and I think I am buying good cotton it may be bad; I cannot tell the quality of the cotton unless I sample it.

I don't care how the bales are packed, as long as I can sample them. My customers give me orders for cloth on the samples shown them, and if I don't know what I am doing how can I make the goods right?

Mr. JOHN E. PREST. Mr. President, the question seems to come down to the point of what it costs to manufacture — that is, suppose we take the round bale, the Lowry bale, or the square bale of five hundred pounds, how much more would it cost in an ordinary square bale per pound — what do we have to pay for the bales, that is the question. How much more have we got to pay to buy it in that form, in the Lowry bale than in the common square bale?

Mr. STEPHEN A. KNIGHT. There are really two questions being discussed, gentlemen. The point I intend to make is, which of the bales costs the least money. Then the matter of sampling is another question. Mr. SIMPSON maintains, and I don't say but that he has good ground for it, that the round bale cannot be properly sampled. Mr. HILL claims that it can be properly sampled.

Now the first question I want answered is, which costs the least money. Then the next question which I regard as entirely different from the first, is the matter of sampling.

We buy our cotton today from the samples that the broker sends us. He pulls them from the outside of the square bale, from the first layer, and we frequently find a different cotton in the center of the bale from what is on the outside, so that in buying cotton in the square bale, with all the advantages we have in sampling the square bale, we don't get what the sample

shows us, and we often spend more money in getting that thing into shape than the difference in the value of the cotton.

Mr. LOUIS SIMPSON. There is a law which takes care of mixed packed bales.

Mr. STEPHEN A. KNIGHT. Yes, exactly, but as I say, the point is, which of the three methods costs the least money, and then how much less. Then the next question is, which of the three bales can be more readily and better sampled or do we know anything about it from the samples we ordinarily get. I think we know very little about it. We know what the outside of the bale is, but we don't know about the center.

Mr. LOUIS SIMPSON. I really don't like to have a controversy Mr. President, but I really don't think it is quite right for the gentleman to ask such a private question. It has no interest to me at all. If I want to ask him how much it costs him to make his printed cloth, he might say that the question was a little too personal; and when Mr. HILL is asked how much it costs to put up a round bale or a square bale, he might say, "I have no objection to telling you privately, but I don't feel like stating it publicly."

I have no interest in these bale companies and so far as this Association is concerned, the question would seem to me to be at what price are the companies going to sell the cotton baled in these bales. I understand there are some companies that boast very big capital shares, and that have been splurging around in an extravagant manner, and of course it would cost them probably good deal more to make a dividend on their shares than it would a other companies. It is the first time I have ever seen the gentleman who has spoken about the square bale here, today, but to my mind I think the question is, not what it costs but what we can buy the cotton for — we don't care as to how much or how little these men make. They can throw away a fortune if they like — it makes no difference to us; we are here to buy cotton; we are not here to investigate into their private affairs

—we are here to buy their cotton at the very lowest price we can get it, and I think if Mr. KNIGHT would alter his question and ask, "Will you sell that bale, or will you sell the Lowry bale, as cheap as you will sell the round bale or will you sell it cheaper?" I think that would be more to the point.

Mr. JEROME HILL. Don't make any mistake about this matter. I have no secret of what I make in this bale or any other bale in the cotton business. There is the Dederick bale, the Lowry bale, and we have the old-fashioned bale we are all familiar with, and after all, really the difference in the price of the different bales is not material — they are the same thing. I am perfectly free to tell you it costs no more to put up the round bale of cotton than it does the square bale.

Mr. STEPHEN A. KNIGHT. Does it cost as much?

Mr. JEROME HILL. No, it does not cost as much.

Mr. STEPHEN A. KNIGHT. These gentlemen come to us with three or four samples of new methods of putting up cotton for the market, bringing in the cotton to us, and the point that we want to know—we run our mills for the money we get out of it and all our goods are made and sold for the profit we get on the goods; now, I maintain it makes a difference what it costs to put up a bale of cotton—in the end it makes a difference what we pay for it. Competition is the life of trade, and competition is what sells cotton, and the point I attempted to bring out was, which of these bales of cotton costs the least money. Now, if we ascertain that, that is one point gained. Then comes the next question for us to consider: if the Lowry bale has injured the staple, if the American bale has injured the staple, if the square bale has injured the staple, all that goes with the price we pay for the cotton. We want to know what the cotton costs first, and then we want to know what it is worth, and then we buy accordingly. I maintain that the question I put to Mr. HILL was pertinent and correct. I don't care a rap about the quality of the cotton until I know what the cost is.

Mr. LOUIS SIMPSON. I would like to take issue with Mr. KNIGHT on that point, and I would say that Mr. KNIGHT'S question is correct and pertinent. I would say this, that Mr. KNIGHT does not really care what the cotton costs him. He is making today more money on seven cent cotton than he made a short time ago on six cent cotton. We may have cheap cotton and yet make no money; we may have dear cotton and make lots of money, and therefore a fraction of increase or decrease in the price of the raw material does not matter to us. We buy our cotton in the same market; we pay the same price for it. The selling basis is governed by competition, but if you start from the same raw cotton basis, what does it matter? I don't care what the cotton grower makes out of his cotton, but if I can get my cotton cheaper than my competitor does, then it does matter; but if if we all pay the same price for our cotton, it does not matter and I would sooner have the poor cotton grower make money and live.

Mr. STEPHEN A. KNIGHT. That is the basis I was trying to get at.

Mr. LOUIS SIMPSON. I did think you were asking a question that was a little bit personal.

Mr. STEPHEN A. KNIGHT. I am very glad that Mr. HILL has a champion. He himself did not make any objections.

Mr. LOUIS SIMPSON. Mr. President, I desire to have this thing threshed out. I would like to get in the minds of the Association the fact that it is more important to be able to have the cotton they buy properly sampled than that there should be a general fractional decrease in the price of the raw material. What does it avail if you buy the cotton cheap and get the wrong quality.

Mr. STEPHEN A. KNIGHT. But that was not the point I was discussing.

Mr. JEROME HILL. I think one point in which we are much

interested in the new process is, that we put so much cotton in a car that we want a reduction of freight rates. There is one thing I would like to ask you and that is, why is it they are charging forty-five cents a hundred on pressed cotton from Memphis to Providence today and they only charge thirty-two cents a hundred to take machinery from Providence down to the station where the cotton comes from in the South, both giving full carrying capacity to the car?

Mr. STEPHEN A. KNIGHT. I don't see what that has got to do with the cost of putting up a bale of cotton.

Mr. JEROME HILL. It has something to do with the cost of putting the bale of cotton at your factory. I am getting at the point that cotton is paying the largest freight, and the fact that the steamships recognize the saving of space and take cotton cheaper. I think if the railroads would do the same we could send cotton cheaper to you.

Mr. STEPHEN A. KNIGHT. That is not the question.

Mr. JEROME HILL. Well, I think you can put the round bale down cheaper.

Mr. STEPHEN A. KNIGHT. That answers one question only.

The PRESIDENT. Gentlemen, we will close this informal discussion for the present, as we ought to adjourn at six o'clock, and I declare this session adjourned.

## TOPICAL QUESTIONS.

120. English practice has been in the direction of separating the business of spinning from that of weaving. What are the advantages of this separation? Is there any such tendency discernible in American practice at the present time?

No discussion.

121. What can be offered on the subject of the influence of moisture in the air affecting the strength of yarn?

No discussion.

122. What is the best temperature and humidity for good spinning on fine counts?

No discussion.

123. What is the best way to prevent double yarn on spinning frames where double boss rolls are used?

No discussion.

124. What is the best covering for the top rolls used on frames and mules that are to spin various numbers?

No discussion.

125. What is the best taper or length of wind for mule cops on number 37 filling?

No discussion.

# THIRD SESSION.

THURSDAY, OCTOBER 5, 1899.

---

The Association met at the Temple Club, Dorchester St., at 8 P. M., President CLARKE in the chair.

The PRESIDENT. Gentlemen, shall we give ourselves up to the business of the meeting for a while? The first item on the programme tonight is a paper by Mr. ARTHUR H. GULLIVER on What Must be Done to Spin Fine Yarn on a Filling Frame?

## WHAT MUST BE DONE TO SPIN FINE YARN ON A FILLING FRAME.

ARTHUR H. GULLIVER, Ashton, R. I.

There is no question that filling yarn requires more careful attention than warp. It is more easily affected by atmospheric changes and by variations in the length of the staple. It is a final process, and has not the spooling and warping where it is possible to discover poor work before it is put into the loom. It cannot be handled under unfavorable conditions, as well as on the mule, as there is no opportunity to vary the strain on the yarn with the ease that it can be done with the fallers and the winding motion on the latter machine. This fact is recognized in the desire to obtain the best ring spinners available by paying more per side on the filling than on the warp frames and thus using a more economical class of help.

In fact the continued increase in the demand for frame spinners will make it advisable to pay even more per side to secure a permanent class of hands, that will take a personal interest in their work, and ensure better quality and larger product. If such operatives are employed a better grade of work can be expected and demanded than from the average run of spinners in the mills.

This care must be given in the whole supervision of the room from the overseer to the doffer. It would almost seem as if it should be stated the other way, as the doffer is a very important factor in the running of the filling in the loom. It is absolutely necessary that he should start the yarn on the bobbin, so that it will weave off clean on the loom. The finer the yarn

the more important his work, as the strength of the yarn will not allow any extra strain. The bobbin next claims attention, it must be kept exactly right for the spindle. If it needs reaming on the top or the base, it should be done at once, so that it will be kept in place. As the filling frame requires straight doffing, more or less waste will collect in the bobbin, this must be kept cleaned out so that the bobbins will stand in line, each in its proper place on the spindle.

Have the bobbins made as large on the top as it will pay to run, make the size three-quarters of an inch rather than five-eights; and, after leaving coarse yarns, it is not economy to use half inch, and even on these the larger size is preferable. If it is necessary to spin a finer number than the one that is running on the frames, use another set of bobbins larger on top than those on the regular yarn, and it can be done as well or better than by changing the ring. The top only is mentioned in regard to size of the bobbin, as that is always the smallest part of the barrel, and if that is made larger it will increase the size of the whole in proportion to the taper. This is a very important point in spinning fine filling with success, as the strain on the yarn is always on the small part of the bobbin. It is better to have ridges, rather than grooves, not only on account of making the bobbin stronger, but also to give the larger diameter to relieve the strain on the yarn in spinning. In using this style of bobbin there is a tendency for the yarn to slip over the ridge if the wave comes up to one at the end of the traverse, but the thread can be bound in place by running up slowly and using the quicker part of the cam on the downward course of the traverse. A short cone is better than a long one with lifts of medium height, cut hooking, so that the yarn will not slip off, and a groove cut on the bobbin between the cone and the base will make a better bobbin for weaving. The long cone decreases the length of the yarn that can be put on the bobbin, and requires more stoppage, as the frame will require to be doffed oftener. The ring should not be larger than 1⅜ inches up to number 55 yarn, from this up to 70 1¼ inches, and for finer numbers 1⅛ inches. In making a

choice between two sizes of rings, should give the preference to the smaller, as not a few of the difficulties in spinning fine numbers can be overcome by the use of the smaller ring. It goes without saying that a good ring is required, one that is round, and it will be worth while to try them all and reject those that are not up to the standard.

The traveler should be as light as possible without making too soft a bobbin, and still heavy enough to keep the thread from ballooning so much as to require a separator. The latter should not be used if it can possibly be avoided as it catches a good deal of waste and adds more or less of it to the yarn, even with the best care in keeping it properly brushed. It also interferes with the proper examination of the bobbins on the frame, to see that they are all at the same height and in the proper place on the spindle. The traveler must be made with the right flange for the ring used, and as small a circle as will go on the ring without undue breakage, and it is best to use the round point traveler.

The spindle speed should be low rather than high, as frame spindles are now run. On 60 yarn 7,800 to 8,000 turns is a satisfactory speed, and from that to 8,500 on 36 yarn, but even on this a slower speed will not be a mistake as less speed means less breakage and less twist. The matter of twist is one that gives the most trouble, as on carded stock, there must be more than the standard mule twist. It will need from one and a half to two and a half turns more on average cotton. How much only the running of the spinning will determine, as it must run well, there is no economy in running so that the quality will not be the best. On combed stock there is no question that the twist can be less than standard, and on numbers finer than 65 it will be economy to use this preparation.

The draft should not be too long; 13¼ on 36 yarn will have to be decreased on number 42 to make the work as good, and the yarn as satisfactory. As the yarn becomes finer the draft should be gradually made less, until a draft of ten and one-half is reached for 60 yarn. If it is possible to make finer roving

than this requires with the carding machinery, and still use double roving, it will improve the spinning. In spinning any number it is necessary to use double roving, as the work will not be satisfactory without it. One word more about double roving; a number of mills needing more filling yarn alter a warp frame to the filling wind, still using the single roving, but the results are not the best, and not a little of the fault found with goods made from frame filling, and the making of this filling itself, comes from just this method of spinning filling yarn. Filling yarn will need less twist with a shorter draft, and if possible to make this choice, should give the preference to one tooth less draft, rather than one more tooth of twist and the spinning will show more improvement.

The best conditions can be obtained in a room where the humidity runs from 55 to 65 per cent. and the temperature can be kept low in the extreme warm weather. This would make it advisable not to put the frames on the upper floor under the roof but on a floor below, leaving the upper by choice for the warp yarn.

The frame should be made with short boss rolls, the stands pitched to insure the twist running up to the bite of the rolls, the saddles set so as to leave the middle roll without weight, the thread guides round rather than flattened on one side, and provided with a kink arrester. There should be a traveler cleaner, and the roving trumpets should be made with as small a hole as possible. There should be plenty of space between the thread board and the top of the bobbin, and the choice should always be given to a wider rather than a narrower guage of frame.

There will be no doubt that it is economy to select as good staple as possible for the filling yarn in mixing the cotton, as less twist is to be the goal always sought, the quality of the stock and the evenness of the staple are important considerations. A bobbin filled with yarn spun well will mean good weaving, large production and a medium amount of waste, which should not be any more on twelve bobbins than is usually made by the weaver in putting one cop in the shuttle. Without ques-

tion, the best method of setting the twist is to keep a surplus stock of bobbins, from four days to a week's supply, ahead of the looms and have the filling kept in a damp cellar or on a rack over running water. If this cannot be done, air moistened with water should be blown or sucked through the boxes of filling in enclosed bins. During the cold dry weather it will be advisable to heat the water from the returns from traps on the circulation pipes or from the slashers.

There has been a great increase in the spinning of frame filling within the last few years, and first one mill and then another makes finer and finer yarn. There seems to be no question up to number 80, and the results on numbers finer than 100 seem to be very satisfactory. The saving in cost of production is not the same in every case, but half a cent per pound ought to be possible on the finer numbers of yarn. This with the large saving in cop waste, the most expensive waste made in a mill, makes a strong argument for the frame and the change from mule yarn to frame yarn would seem to be a move in the right direction.

The PRESIDENT. I know you are all interested in that question, and it is now open for your consideration and discussion. We shall be glad to hear from anybody with reference to this subject, which is of vital interest to many of the mills.

Mr. JOHN T. MEATS. (Read by the Secretary in the absence of Mr. MEATS.) The question as to how far it is practicable to spin filling on frames may possibly be answered in as many ways as there are different conditions under which filling is to be spun, and purposes for which it is to be used.

For goods which do not require the *maximum* of elasticity and softness, frame spun yarn may be used with undoubted economy, up to a certain point of fineness; and that point can only be determined by consideration of the conditions involved, such, for instance, as the staple used, the pains taken in preparing it for the spinning frame, and the amount of twist permissible in the yarn. But, for goods which do require the maximum of elasticity and softness, it is not practicable to use frame spinning, for the very obvious reason that up to this time it has not been practicable, successfully, to reduce the twist on spinning frames to the limit of softness which is possible on mules.

Where twist and hardness of yarn are permissible, it has been found practicable to spin filling successfully up to 100s on frames; and in some instances up to 150s even; but beyond 100s the attempt seems to have resulted in an undue amount of labor and expense, and even where such fine numbers have been successfully spun, it has been at the cost of great care in the selection of the staple, and in its preparation for the frame; so that much of the economy which goes with frame filling on the lower numbers, disappears when the higher numbers are reached. So much depends upon the conditions and requirements of frame spun yarn, that a long and detailed statement would be necessary to show just how far to go safely for every number of yarn, and under the various conditions of its production; but it may safely be said, from experience with a large number of

spindles, that where the maximum of elasticity and softness is not required in the cloth, filling may be spun successfully on frames up to 100s, always assuming that the conditions for its production are favorable, not alone in the construction of the frame, which is a simple matter, but in the stock, and in its preparation for the frame.

The PRESIDENT. If no one has any question to ask, we will pass over topical questions

126. Is it practical to spin numbers finer than 65s on larger rings than 1½ with spindle running 9,000 revolutions?

127. What is the maximum length to put No. 100s on bobbin?

128. How far is it practicable to substitute frames for mules in spinning filling?

to the next article on Oiling Fly Frame Spindles, by Mr. RUSSELL W. EATON of Brunswick, Me.

## OILING FLY FRAME SPINDLES.

RUSSELL W. EATON, Brunswick, Me.

In presenting the subject of the oiling of fly frame spindles to this Association, I attach more importance to it possibly than many other members because my experience at one time brought very forcibly to my attention one of the evils attending it. I refer to an occasion when I was called upon to locate the cause of certain stains in the goods. I do not doubt that a great many of the members are able to fix at once on the true cause of any oil stain that may appear in the cloth. I have only to say that in this particular case the cause had not been found. The particular stain to which I refer was in the filling. I adopted the rough method of ascribing the trouble to the weave room and insisting that the overseer should stop it and should do so promptly. This brought from the overseer of weaving several cops with stains in them. Going to the overseer of mule spinning, and now reinforced by the stained cops as evidence of guilt I made the same demand upon him. This brought from him the roving which was the cause of the trouble. We were now getting nearer. I had located the particular card room which was doing the mischief. I will say that I was sincere in my first attempt to lay the blame on the weave room as I had supposed that the stain was produced in an old steam box from the dripping. Having at last driven the trouble back to the carding department I went over the matter with the overseer and finally the trouble was located. The intermediate bobbins were very old — were all cracked and all oil soaked. I found that the oil worked through the cracks and stained the first

layer of roving where it touched the bobbin. This was not noticed. In fact it could not be as the stained part was always concealed. Throwing out nearly all the bobbins and putting new ones in their places was the next thing and the oil stains were reduced until from five bales weekly of oil stained goods, they entirely disappeared. I have thought that it might be interesting to some of the members to show samples of cloth containing stains of the character I mention. I have therefore taken bobbins and drawn a line of black oil on their surface so as to produce the same effect as that from cracked and oily bobbins. I have then had the roving made into filling and woven.

No. 1 contains filling which was stained on the slubber bobbin.

No. 2 contains filling stained on the intermediate bobbin.

No. 3 contains filling stained on the fly frame bobbin.

I have also prepared sample No. 4 in which the filling was stained in the cop by a streak in the side. An examination of these stains with the knowledge of their causes will enable a person to locate promptly the cause when the stain appears in the cloth room. I have had one occasion since when I was able promptly to locate the cause of a similar stain in the goods.

Not long ago a bobbin maker told me of a complaint that came to him of yarn being stained by oil from filling bobbins which he had just furnished a mill and an examination of the work showed the trouble to be in the cracked bobbins in the card room. The occurence which I have narrated above led me to take considerable interest in the subject of oiling fly frame spindles. I find several builders have self oiling or magazine steps for the spindles. There is also the well known Jackson method which has many friends. The Lowell Machine Shop has an improved shape for the top of the spindle. All of these forms however, like the common form, require oil to be put on the spindle and on the bobbin gear. These parts must be oiled of course and in all cases oil is likely to fly out on to the rest of the machine and the bobbins are sure to get more or less oil in

them. There is however a method which was patented by Mr. LEANDER SHEPARD and lately sold to the Saco & Pettee Machine Shops which seems to do away with this trouble. The oil is in a magazine in the bolster tube and oils the spindle near the top of the tube. An opening filled with a fibrous substance also allows oil to pass to the bobbin gear. In addition to this all the bolsters are connected by tubes and then with a central oil receptacle. In this way all the spindles and all the bobbin gears in a roving frame can be oiled from one point, namely, a receptacle located near the centre of the machine.

We have one slubber and one fly frame fitted with this arrangement that have been running successfully for nearly two years. I trust that the Saco & Pettee Machine Shop people will perfect the arrangement and present it to the manufacturing public.

TOPICAL QUESTION.

129. What means have been found useful in diminishing the number of oil stains?

No discussion.

The PRESIDENT. The next item on the proceedings for this evening, as it has not been deemed expedient to discuss the topical questions, is the paper by Mr. CHARLES H. FISH of Dover, N. H., on Practical Results Obtained in the Drying of Textile Fabrics with the Assistance of a Vacuum.

# THE PRACTICAL RESULTS OBTAINED IN THE DRYING OF TEXTILE FABRICS WITH THE ASSISTANCE OF A VACUUM.

CHARLES H. FISH, Dover, N. H.

Passing from the theoretical possibilities as touched upon briefly in a paper presented at a meeting of this Association one year ago, and taking up what is apt to be of more interest to the majority of us, namely, The Practical or Actual Results to be Derived from the Use of a Partial Vacuum in Connection with the Drying of Textile Fabrics, I venture to present you herewith a few facts deduced from the results of an extended test of a vacuum drying machine now in operation at the Cocheco Manufacturing Company's Print Works.

I would say in beginning that the following facts and figures are based upon the average actual every-day results, and no account is taken of the fact that upon certain days or at certain periods the results are very far in advance of the average results. The problem presented was the construction of an air-tight casing connected with a vacuum pump, or other means of producing the vacuum, and means provided for passing the fabric into this chamber and out again without admitting sufficient air to interfere seriously with the maintaining of the vacuum. It would seem that this problem has been satisfactorily solved.

The machine which we are now running has been in operation nearly eight months, running regularly with the rest of the works and drying the cloths of various kinds as they come damp from the squeeze rolls of the washing machines. This machine consists of a cast iron chamber containing 14 drying cylinders

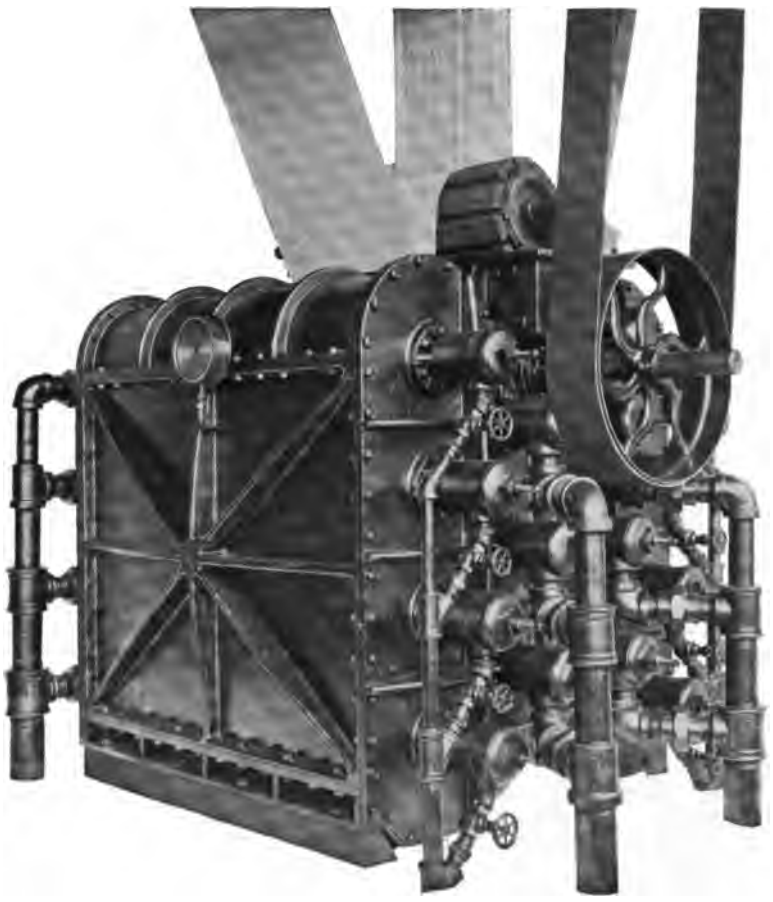


FIGURE 1.

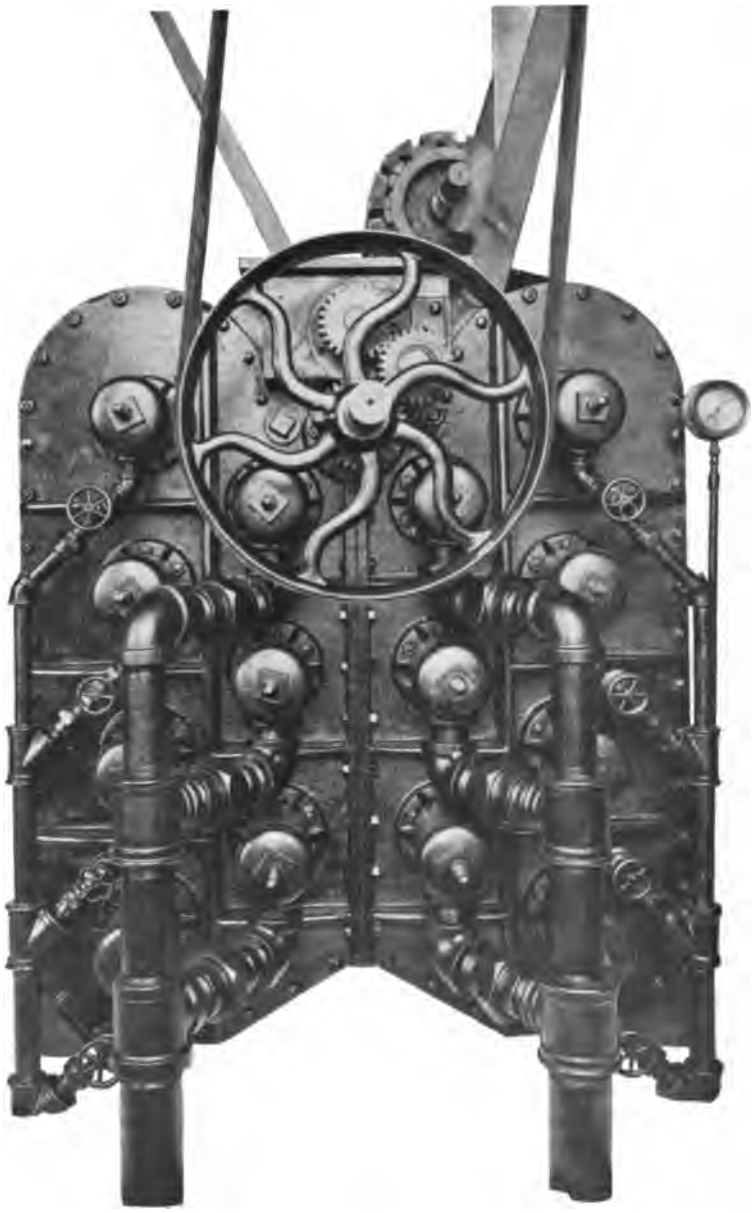


FIGURE 2.

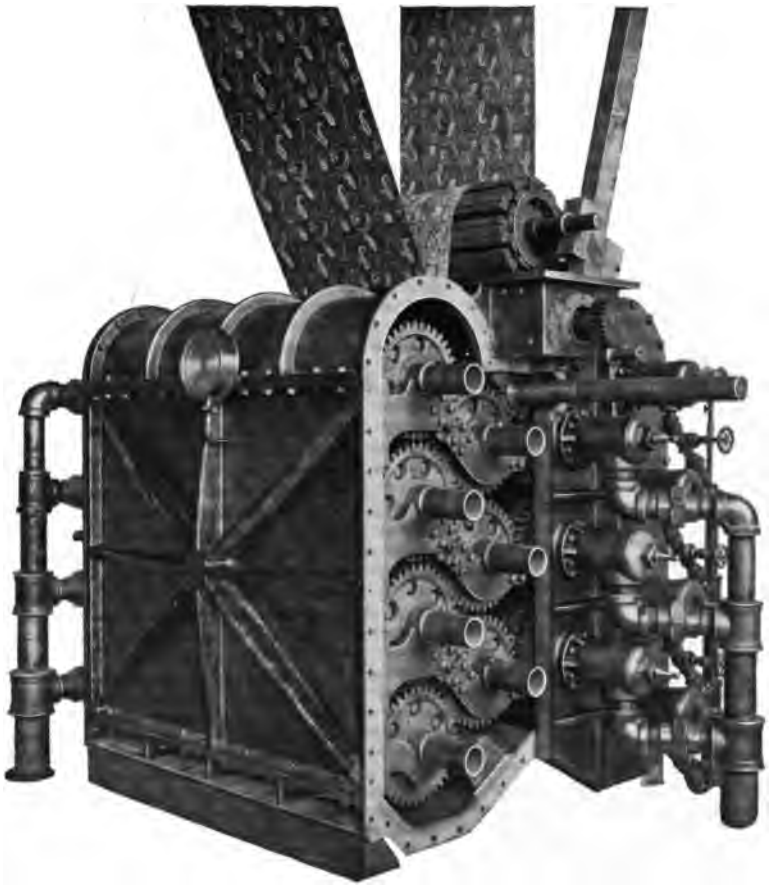


FIGURE 3.

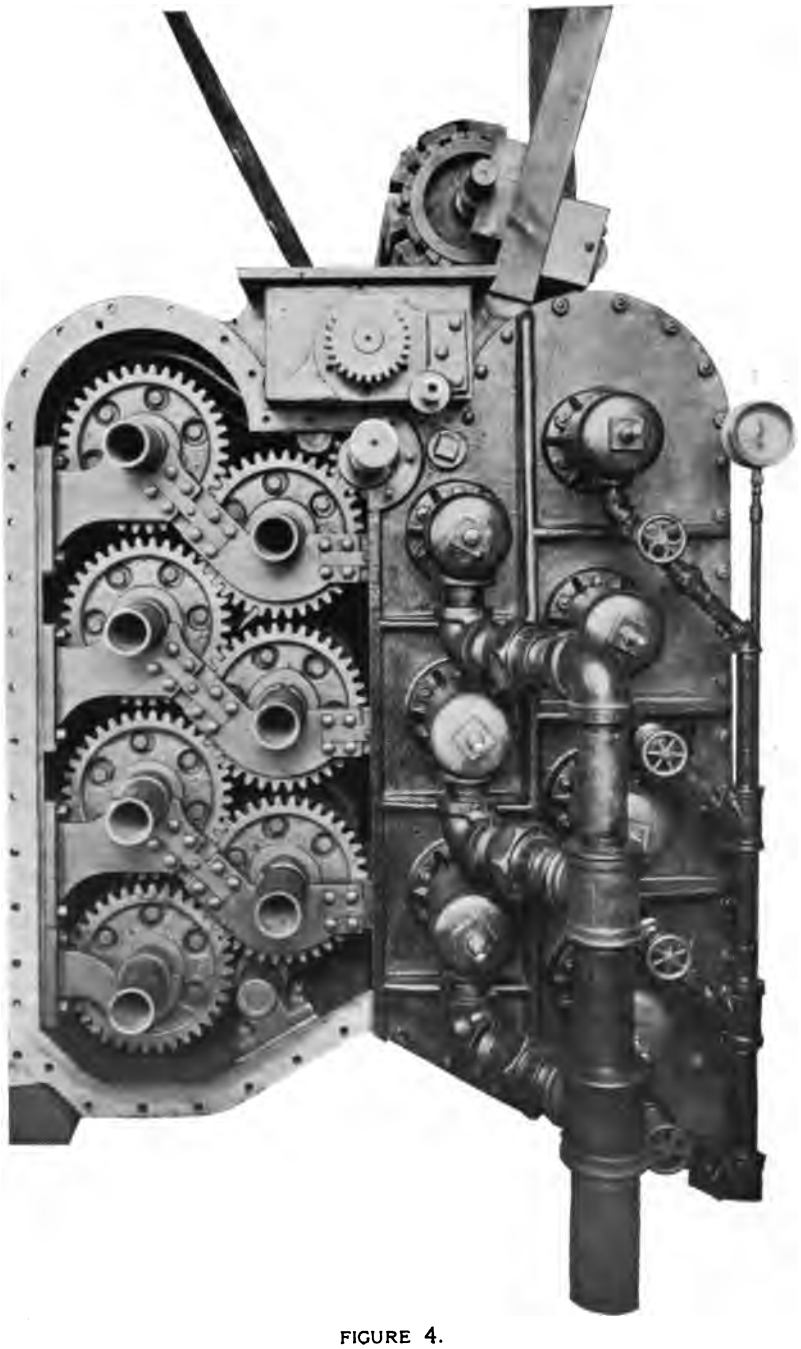


FIGURE 4.

each 11½ inches in diameter. A general view of the machine is shown by Plate No. 1. The size is as follows: width of casing, five feet; extreme width, including pipe connections, seven feet, two inches; extreme height, five feet, two inches; extreme length, four feet, nine inches.

Plate No. 2 shows the end of the machine, while Plates No. 3 and No. 4 show the machine with one-half of the side plate removed, exposing the drying cylinders and the gearing connecting them. The roller gate, through which the cloth enters and leaves the machine, is located on the top of the casing and consists of three rolls, two of them three inches in diameter and one of them four inches in diameter. These rolls are geared together and are packed along their bottom surfaces and at the ends, with a system of metal and fibre packing. The pump used in obtaining the vacuum is a Deane steam vacuum pump, size 10″ x 13″ x 12″, and under ordinary conditions is run at a very moderate speed. The cost for maintaining the vacuum is still somewhat of an unknown quantity. It is proven, however, that this cost will not be of great importance. If a steam pump is used, the exhaust from the pump is passed into the drying cylinders, but, wherever it is possible, a power pump, driven from the line shafting, would in all probability be preferable.

Located in our works near the vacuum drying machine and drying exactly the same cloths from day to day, we have a set of horizontal drying cylinders consisting of forty cylinders each 23 inches in diameter. This is the ordinary type of drying machine as found in most bleacheries and print works. The steam is furnished to this machine from the same main as the steam furnished to the vacuum machine, and is therefore at practically the same pressure.

We have in our tests accepted this machine as the standard for an ordinary drying machine, and comparisons of the results obtained by this machine have been made with the results obtained by the vacuum machine. These results all would seem

to show that the conclusions arrived at, and which are herewith given, are conservative.

One square foot of heating surface under 20 to 21 inches of vacuum will dry about as fast as three square feet of heating surface on an ordinary dryer. This makes the vacuum dryer with its 14 cylinders 11½ inches in diameter about equivalent to an ordinary dryer having 20 cylinders of 23 inches diameter, or 40 cylinders of 11½ inches diameter, or, in other words, the vacuum dryer, under the above conditions, would do about three times as much work as the ordinary dryer having the same heating surface. If a vacuum of 25 to 26 inches is maintained, it would make the 14 cylinders of 11½ inches diameter in the vacuum dryer equivalent to about 30 cylinders of 23 inches diameter, or, 60 cylinders of 11½ inches diameter in the ordinary dryer, or, in other words, under the above conditions the vacuum dryer would do about 4.3 times as much work as the ordinary dryer having the same heating surface.

To illustrate the saving in space, I will say that the ordinary dryer of 30 cylinders 23 inches diameter would occupy about 6.7 times the floor space of a vacuum dryer of the same capacity: that is to say, that it would be 6.7 times as long, the width and the height being practically the same. A 20 cylinder set of 23 inches diameter each would occupy about 4.5 times as much space.

Another point greatly in favor of this system of drying, and which I think will be appreciated by all manufacturers, is the absolute freedom from steam or vapors and the almost absolute freedom from heat. All of the vapors caused by the drying of the cloth are, of course, carried off by the pump, there being no possible way in which they can get out of the enclosed chamber. There will be a slight radiation from the iron casing of the machine, but, as the internal temperature is only from 150 degrees to 160 degrees Fahrenheit, it cannot be of great annoyance. If necessary, the casing can be covered with some non-conducting material.

As to the difficulties in maintaining the roller gates and in

keeping them tight, I would say that the present machine was designed for a double set of roller gates, the idea being to have a small intermediate chamber between the gates, from which the air was to be partially exhausted, thus leaving only part of the work to be done by each set of gates. In constructing the machine, however, only one set, the lower one, was built and applied, and this gave such satisfactory results that it was considered unnecessary to apply the second set until the success of the machine as a whole had been determined.

TOPICAL QUESTIONS.

130. What steam pressure should be carried on slashers running on colored work, and what is the best means of returning to boilers the condensation from slashers?

No discussion.

131. What is the quantity of steam properly required for slashers and the best means of applying the same?

No discussion.

The PRESIDENT. In 1885 a current of electricity was sent from St. Stephens across to Calais in the United States. The collector of custom duties at Calais, Maine, applied to the authorities in Washington for a decision as to what duties should be charged upon that current of electricity coming from a foreign country into the United States. The decision of the authorities at Washington was, that inasmuch as the current of electricity could not be measured, and had no weight, therefore there

was no duty upon it. In 1888 a current of electricity was sent from Niagara Falls into the Dominion of Canada across the Niagara river, and the same question was put to the authorities of the Dominion of Canada as to what duties should be charged for receiving that electric current into the Dominion of Canada from a foreign country of the United States, and the decision was that it was among the unmentioned commodities, and that a duty of 20 per cent. should be placed upon it. [Laughter.]

These questions having arisen, another one has occurred to me. Perhaps many of you are aware that in the borders of the United States, bordering upon the country of Mexico, there are many bees and much honey, and during the day time the bees are accustomed to cross the river and get their honey from the flowers in Mexico; they return at night into the United States and deposit their honey. Now I don't know that that question has ever been settled as to what duty should be charged, or who should pay it, whether the persons that own the land or the persons that take the honey from the hives in the United States, but it has occurred to me that inasmuch as electricity has been applied to such a multiplicity of uses during the last few years, and been employed in so many delicate operations, whether the time may not come when science may so manipulate that little current of electricity that it shall take the honey from the bee, and send it on lightning's wings into some appointed warehouse of the United States and so we shall be able to collect the duty from those who take the honey therefrom. [Applause and laughter.]

We are to hear about electricity tonight, and though I don't ask the gentleman to solve that question, still we will hear something about the electric power transmission at Valleyfield, which is the subject of a paper by Mr. J. J. ASHWORTH, of Toronto, and which in his absence will be read by title at this time, and copies will be distributed to the members on the train tomorrow morning, but we have here with us a representative of the General Electric Company of Schenectady, New York, Mr. GEORGE F. STEELE, whom I will call upon for a few remarks.

# DESCRIPTION OF THE ELECTRIC POWER TRANSMISSION PLANT AT VALLEYFIELD.

J. J. ASHWORTH, Toronto, Ontario.

An interesting feature of the recent convention of the New England Cotton Manufacturers' Association at Montreal, Canada, was the visit of the members to the electrical installation of the Montreal Cotton Company, at Valleyfield, Quebec.

This plant is of particular interest as being the first in which the electric drive, in conjunction with water wheels, is being used for the extensive operation of cotton mill machinery in Canada, and also on account of the reasons which led up to the use of electricity as a motive power.

The town of Valleyfield is situated about forty miles from the city of Montreal, on the Quebec side of the St. Lawrence river, and the mills obtain their water supply from an expansion of the main river, known as Lake St. Francis, discharging into the river again, at a point some distance below, between which and the intake, there is a difference of level sufficient to give 13 feet head at the wheels, with, practically, unlimited quantities of water.

The mill plant, as in many other cases, has from time to time been extended from comparatively small beginnings, as the conditions existing at such times seemed best, as the result of which the driving system became gradually too complex and ponderous to be efficient; consequently, when the recent extensive additions were contemplated, it became necessary to make some radical changes. After a thorough investigation into methods adopted by the larger mills of the United States, some of which

were using electricity, and carefully considering the local conditions, the company decided on the construction of a single generating plant, and a system of electrical distribution by motors in the different buildings, which could be located in such a manner as to drive several small shafts, and thus do away with much of the large shafting, gears, and belts.

The power house, as at this time constructed, provided for four generating units, of 500 horse power each, and was located, as shown in the engraving, conveniently to the head race, at the south end of the main building. This was a stone structure with steel roof trusses and steel roof, and of dimensions ample to accommodate the hydraulic and electric plant as contemplated. The building was commenced in the spring of 1896 and completed and equipped with one of the 400 kilowatt generators before the end of that year, a similar unit being added the year following, and the remaining two units in 1898, reaching the limit of this power house. Each of the generators is directly connected to a jack shaft, driven by two McCormick vertical turbines, under a 13 foot head, with crown wheels and pinions, as, owing to the low head, it was not thought advisable to use the horizontal wheel. All the generators now in use are of the same type and capacity, being what are designated A. T. 36-400-200-600 volt, or in other words, they each have a capacity of 400 kilowatts at 200 R. P. M., giving a three-phase 600 volt current at this speed. These, and in fact the entire electrical equipment, were furnished by the Canadian General Electric Company, Limited.

The switchboard consists of the exciter and generator panels and feeder panels, from which are led the motor circuits. These feeder panels are equipped with switches for controlling each circuit, thus avoiding the use of switches at the motors themselves, and a signal bell and annunciator system is used when switch is to be opened or closed, and the motor started or stopped.

The motors are suspended from the ceiling or placed upon the floor, as occasion demands, and are all of the induction type,

FIGURE 1.—WORKS OF THE MONTREAL COTTON COMPANY. LOOKING ACROSS THE HEAD RACE.

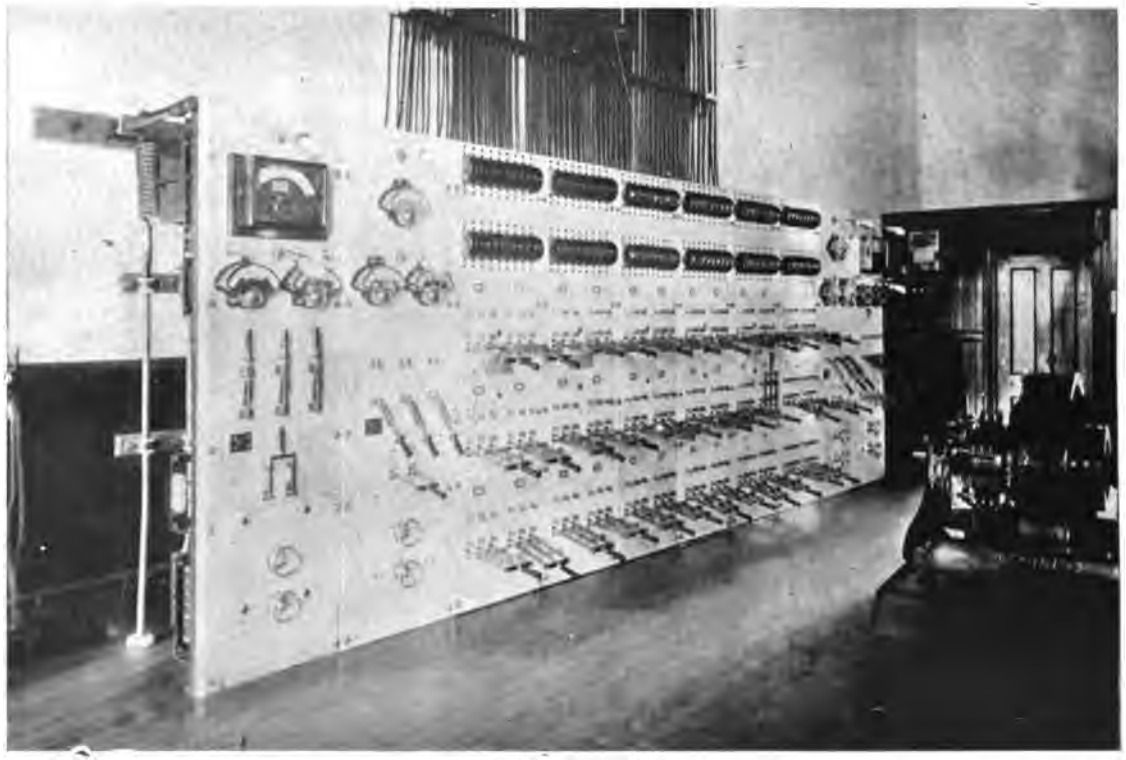


FIGURE 2.—GENERATORS AND FEEDER PANELS.

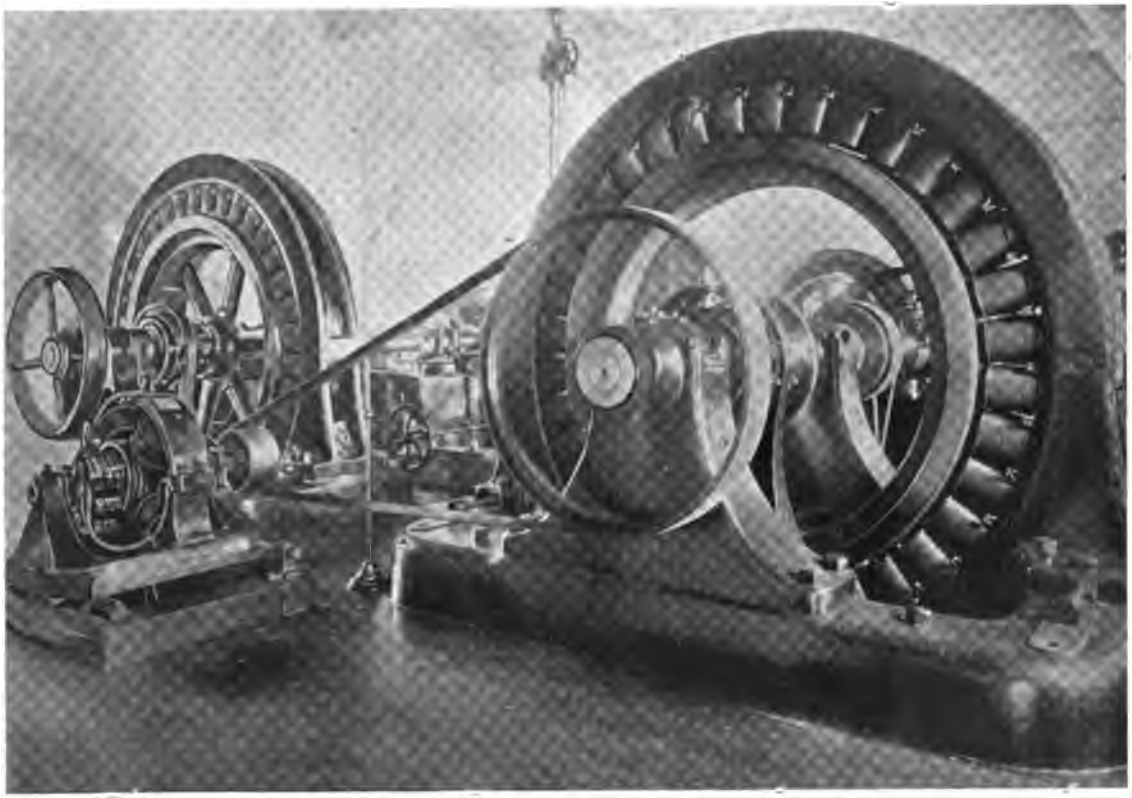


FIGURE 3. — TWO OF THE 400 KILOWATT THREE-PHASE GENERATORS.

FIGURE 4. — EXCAVATING FOR POWER HOUSE EXTENSION.

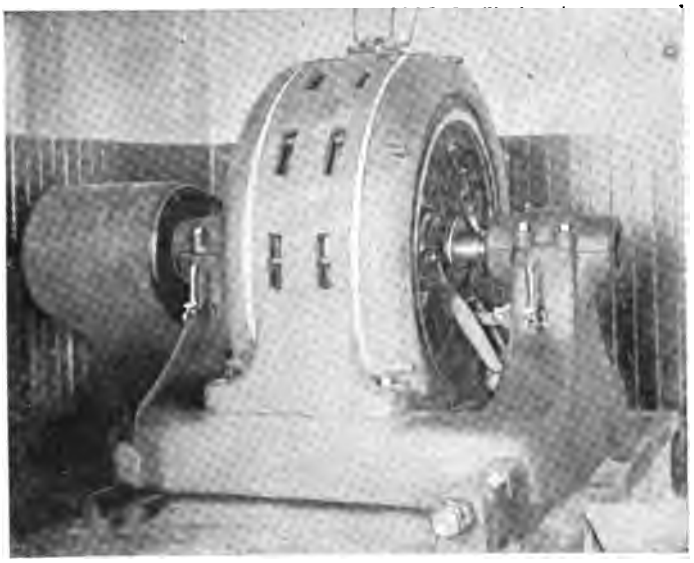


FIGURE 5. — 100 HORSE POWER MOTOR.

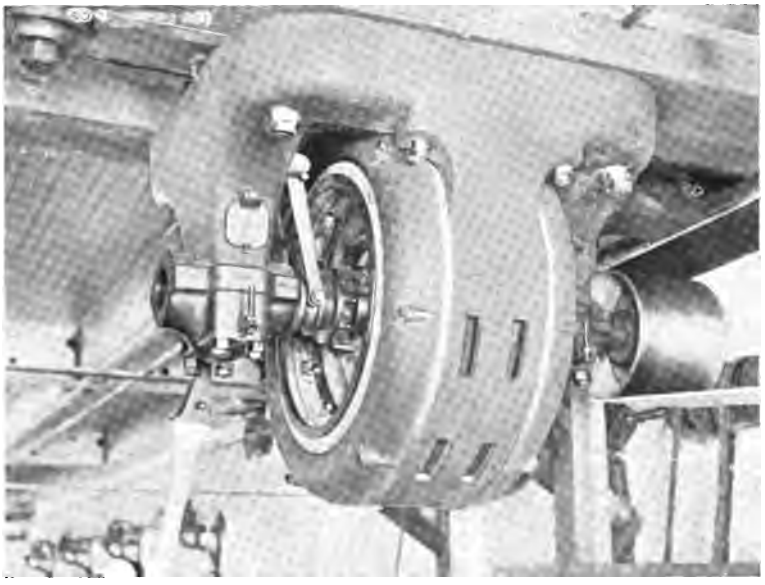


FIGURE 6. — INVERTED 100 HORSE POWER MOTOR.

FIGURE 7. — PRESENT POWER HOUSE.

FIGURE 8. — CLUB HOUSE FOR THE USE OF EMPLOYEES OF THE MONTREAL COTTON CO.

with starting resistance in the armature, with one or two exceptions. They are also capable of starting very heavy loads, with a minimum amount of current. The largest is of 200 horse power, and the smallest 30 horse power capacity, and to all of them the current is distributed from the generator without the interposition of transformers, at 550 volts. There are about 40 in use, with several more in process of manufacture, but this number will be doubled when the present extension is completed. This extension is now under construction, and, as will be seen from the illustration of the excavation, will more than double the present power plant.

In carrying this out there will be installed two units of 1200 kilowatts capacity each, or a total addition of 3250 horse power, which are now under construction at the works of the Canadian General Electric Company, Limited. These large units will each be directly connected to a jack shaft, driven by six McCormick turbines, similar to those already installed. They will be of the revolving field type, designated as A. T. B. 36-1200-200, and will be arranged to run together with, or separately from, those at present in operation, by means of a suitable switchboard and bus bar arrangement.

A feature of the new power house will be an imposing tower, the ground floor of which will contain all the generator, exciter and feeder panels, while from the second story, will radiate the motor circuits, to the various departments.

For exciting the generators there will be used two 85 kilowatt direct current machines, each having a capacity sufficient for the excitation of the entire generating plant, driven by separate wheels, which arrangement will obviate even the possibility of a total shut-down.

A notable point in this installation is the increasing use of the alternating enclosed arc lamp, of the special mill type, for illuminating purposes, replacing, as it does, in many cases where increased brilliancy is required, the incandescent lamp formerly used, and increasing the output during the hours in which artificial light is necessary.

When completed, this will be one of the most extensive electric industrial installations on the continent, having a total capacity of 5400 horse power, and for economy of operation, massiveness of construction, and nicety of detail, will constitute a model, which may well be followed by those interested in the subject of power transmission, and the Montreal Cotton Company is to be congratulated upon having built up an enormous Canadian industry by shrewd management, attention to economical production, and a proper appreciation of the necessity of the times.

Mr. GEORGE F. STEELE. I did not come here tonight expecting to speak on this subject, as I know very little about the plant of the Montreal Cotton Company, as it was put in by our Canadian Company. On this account I am a total stranger to the plant, and shall make my first visit to it tomorrow.

I supposed, when I saw the topic on the programme, that Mr. LOUIS SIMPSON, or some one else connected with the Montreal Cotton Company, and therefore acquainted with the plant, would speak upon the subject. As I have not yet had the pleasure of meeting Mr. SIMPSON, I cannot tell whether he is here tonight. . . . As he does not seem to be here, I will simply say that, so far as my knowledge does go, they have two generators driven from a water power near the mill. These generators aggregate about 1200 horse-power and furnish current to a number of motors, perhaps 20 or 30, and of from about 25 horse-power to 200 horse-power in size, for distribution of power in the different rooms and sections of the mill. Other than this I know nothing about the details of the plant.

The PRESIDENT. Perhaps Mr. LACEY would favor us with a few remarks on this subject.

Mr. FRED LACEY. Electricity is one of those things in a cotton mill that I have not had time to study. It has been very satisfactory from our experience, from an economical standpoint. I cannot say anything about it, but we are enabled to run any one room, or part of a room at times, when necessary. We are running motors from fifteen to two hundred horse power, and we have not had any trouble with any of them thus far.

# FOURTH SESSION.

FRIDAY, OCTOBER 6, 1899, AT 9 A. M.

---

At 9.00 A. M. a special train furnished by the courtesy of the General Electric Company of Schenectady, New York, and the Canadian General Electric Company, Limited, of Toronto, Ontario, left the Grand Trunk Railway Station for Valleyfield, where, as the guests of our members, Mr. LOUIS SIMPSON, General Manager, and Mr. FRED LACEY, Superintendent, of the Montreal Cotton Company, the party were shown the electric power plant and other objects of interest. The train returned leaving Valleyfield at 12.30 P. M., reaching Montreal in time for lunch.

# FIFTH SESSION.

FRIDAY, OCTOBER 6, 1899.

---

The Association met in Windsor Hotel at 6 P. M., President CLARKE in the chair.

The PRESIDENT. The hour is so late, and the day has been so full of pleasant experiences that we are hardly in a frame of mind to consider such a question as The Economy of Using Turbines at Full Gate, and The Advantages of Coke over Coal as a Fuel for Generating Steam, and Mechanical Stokers. We will therefore omit the reading and discussion on those papers. They will be printed in full, however, in the record of the transactions, a copy of which each member will get, and if it is desired they may be discussed at the next meeting of the Association in April next. We will also pass over the discussion of the topical questions.

# THE ECONOMY OF USING TURBINES AT FULL GATE.

FRANK P. VOGL, Claremont, N. H.

The following memorandum is given as an example of the several advantages accomplished by the use of water wheels at full gate. The use of the steam engine as auxiliary to water wheels gave an easy means of making the test by the indicator cards, showing the value of the use of the water at full head on one pair of wheels, rather than dividing it between two pairs.

The Monadnock Mills have two pairs 54 inches, Humphrey horizontal wheels under 20-foot head and giving, at full capacity, sufficient power to operate the mills. As auxiliary power a 24″ by 48″ Brown engine is used and this supplies enough power to keep water level with top of dam; thus giving full head to water wheels. Both pair of the water wheels and the engine are belted on to the same main shaft and the engine does the regulating when used, the gates of wheels being hoisted just enough to keep the water level with top of dam. June 9, 1899, with both pairs of wheels in use the indicator showed engine 120 horse power. With one pair of wheels in use the indicator showed engine 83½, showing a gain by using all the water on one pair of wheels of 36½ horse power. This shows a gain of 30 per cent. in power required by steam and a consequent better use of the water. I submit the foregoing as being an example of actual use and which may be of value to some member of the Association in putting in wheels, where used with auxiliary steam power, and is also submitted at the request of the Board of Government for a practical paper on a practical subject and I trust it may be so considered and that it may encourage other members to relate similar occurences that come up from time to time.

Col. SAMUEL WEBBER. (Read by the Secretary in the absence of Col. WEBBER.) I see by the notice of the next meeting of the Association that a paper is to be presented on The Economy of Using Turbines at Full Gate. While I am unaware of the arguments to be presented, I think that I can offer a very simple explanation of the cause of such economy and of the reasons why "part gate" results are unsatisfactory.

The late Prof. DE VOLSON WOOD examined this question mathematically a few years ago, and although I have not his paper at hand to refer to, I call recall the substance of the results, as follows: That the step and shaft friction of the wheel; the friction of the water in the guides and buckets, with a probable loss of from one to two per cent., by slip, would amount to about 15 per cent. of the gross power of the water applied, so that the net results attainable could not be estimated at over 85 per cent. Now this is perfectly corroborated by my own experience. Out of the many turbines I have tested, I have but two records, which slightly exceed this result, and can find but two of Professor THURSTON'S, and one by EDWARD SAWYER of Boston, the latter of the same type of wheel as one of mine, "the Risdon", which just touch 86 or 87 per cent. EMERSON'S tests were so notoriously unreliable that no attention need be paid to his 92 per cent. reports as the same wheels would never repeat them. Now this 15 per cent. loss or 15 H. out of 100 of the water applied, would, in case only 50 H. of water was applied, remain practically the same, and become 30 per cent. leaving only 70 per cent. net effect at half water, which is a well established record for a few of the best turbines. Although the loss by friction of water would be less with less water, the deficiency would be fully offset by the broken volume of water which would reach the wheel when cut off by the gate, and a probably greater percentage of slip.

Published reports of tests seldom go below half water, or half gate which is about five-eighths water, but I have tested turbines down to one-quarter water, experimentally, which gave about 40 per cent. effect, or varied from 30 to 40 per cent.

This holds good with the whole gate law, for if the water was reduced from 100 H. to 25, the friction loss of 15 H. as above, is 60 per cent. of it, leaving only 40 per cent. to be saved. In fact, most of my trials have shown less than 40 per cent., probably owing to the breaking up of the small body of water by the cut off at the gate.

I think these data will show sufficient reason for always using a turbine at as full gate as possible, and in case of large powers and variable streams, of using several small wheels instead of one large one, running as many at a time as can be supplied with water at full gate, and using surplus water down to half gate, on one spare wheel. The first cost of instalment may be greater, but the economy of water, in future use, will, in the long run, more than compensate for the original outlay.

TOPICAL QUESTIONS.

132. What is the best method of utilizing the waste products of a mill?

No discussion.

133. What is the best method of treating belts and their proper use?

No discussion.

# ADVANTAGES OF COKE OVER COAL AS A FUEL FOR GENERATING STEAM.

ARTHUR C. FREEMAN, Waltham, Mass.

The item of fuel being one of the large items of expense entering into the cost of manufacturing, is necessarily one in which every manufacturer is interested.

The most important fuel in use at the present time is coal. The cases where wood is used are exceptional, and becoming more so as the population increases, and timber becomes scarce and more in demand for structural purposes.

It is only recently that the question of coke has been seriously considered by manufacturers here in New England, although large quantities are annually consumed in the West, where it enters into competition with both hard and soft coals.

One of the reasons why this fuel has not been more extensively used in New England is possibly due to the fact that it is only recently that its manufacture has been attempted on a commercial scale.

The heretofore high cost has also been one of the reasons for its no more general adoption.

Coke, as generally understood, is carbonized coal, or the carbon of the coal left in the ovens after expulsion of the volatile substances by heating, or as it is generally called, coking. The volatile substances, viz.: tar, pitch, gas, ammonia, etc., are smoke producers. About one-third of the weight of the coal is thrown off in the coking process; the carbon in one and one-half tons of coal is therefore largely represented by the carbon in one ton of coke.

The manufacture of coke is generally carried on in heaps, retorts, or ovens, and is spoken of as gas or oven coke, referring of course, to its mode of production. In the case of oven coke, the object is not so much to prepare coke as it is to obtain gas, tar and various other products.

In the present day, coal is converted into coke almost exclusively in ovens constructed for this purpose, it having been found that by the use of ovens the operation is more readily conducted, and that a larger quantity and better quality are obtained.

Coke is prepared for various purposes: For increasing, or rather concentrating the quantity of carbon in the coal, and thus obtain a fuel which will yield a more intense heat than coal. For the purpose of converting coal into a fuel which does not become pasty when ignited. Coal in consequence of this property being unsuitable for blast, cupola, or other furnaces.

Well burnt coke, or oven coke, is a hard, uniform, compact, solid mass, difficult to break, and not honeycombed, or very porous. Its color is black-gray or iron-gray, with a dull metallic gloss. Good coke should contain very little sulphur.

When discharged from the ovens, coke consists chiefly of columnar pieces about eight inches long and four or five inches thick, with smaller pieces mixed in. By a specially designed crusher, it is then broken up into various sizes, as egg, nut, and pea. For boilers it is generally used as it comes from the ovens.

The advantages claimed for this fuel are that it is clean, there being no dust, no dirt, no smoke, and but few ashes. It kindles quickly, makes the hottest fires, is easily controlled, and requires but little draft.

It does not clog the boiler flues, thus obviating the frequent and expensive cleaning. This secures the complete utilization of the heat value of the fuel.

It is smokeless. When looking at the stack of a boiler fired by coke, it is impossible to determine whether the boiler is running or not. This absence of smoke, especially around bleacheries and other places where expensive and fine work is carried

on, and in thickly populated communities, where soot and smoke are so destructive, is a matter of no little importance.

Its general use would probably do away entirely with the smoke nuisance encountered in some of our large cities, and would add immeasurably to the comfort of those who travel by steam where coal is used.

At the present time this question of smoke from soft coal is receiving the very serious consideration of the municipalities of some of our large Eastern cities. New York is seriously threatened with the same affliction that has beset Pittsburg and Cincinnati, and Boston is fast losing its prestige as a clean and healthful city. Fine buildings are being injured by smoke, and what is far worse trying to the individual, the interior of houses likewise suffer from the same cause.

From a hygienic standpoint the health of citizens must in a measure be impaired by breathing in this soot.

With the volatile substances removed, the dangers from spontaneous combustion are entirely eliminated; and it can be kept with safety anywhere, and for any length of time.

Coke is a fuel unlike bituminous coal in its composition, and therefore requires somewhat different treatment when used in place of that fuel. It resembles hard coal, and should be fired in a somewhat similar manner. Some changes in the ordinary grates will probably be necessary to burn coke with maximum economy and convenience, but it can be burned on ordinary grates.

The following suggestions will be found useful in learning its management:

1st. In building the fire, put the coke on lightly and often, until the fire is seven or eight inches thick. An eight-inch fire will make steam much better than a heavier one.

2d. It is better not to disturb the top of a coke fire, therefore when firing, spread the fuel evenly, so as to keep the fire level.

3d. Shaking bars are very suitable for burning coke, and they should be shaken frequently. If dead bars are used, a light

poker should be run under the fire frequently to keep clinkers from clinging to the grate, and to keep them broken up. A poker is better than a slice bar for this purpose, as it is lighter and more easily handled. The object is not to bar up the fire, but to detach small pieces of clinker, and prevent them from forming and running together.

4th. It is advisable to keep water in the ash pit, or to introduce a jet of steam.

Following is the result of a test made by the Mutual Boiler Insurance Co. of Boston on the comparative evaporative powers of coals and coke compared with the best soft coals. Steam making value is the only criterion used in making up the table below. The coke is that of the New England Gas & Coke Co., and the value is based on boiler tests, and on proximate and ultimate analysis.

COMPARATIVE EVAPORATIVE POWERS OF COALS AND COKE COMPARED WITH THE BEST SOFT COALS.

| Soft Coals. | Combustible. | Probable per cent. of Refuse. | Coal as Bought. |
|---|---|---|---|
| Pocahontas | 100 | 7-½ | 100 |
| Best Cumberland | 100 | 7-½ | 100 |
| Average Cumberland | 98 | 7-½ | 98 |
| New River | 95 | 5 | 97 |
| Clearfield | 95 | 10 | 92 |
| Pittsburg (Youghiogheny) | 88 | 6 | 89 |
| Ohio (Hocking Valley) | 80 | 6 | 82 |
| Nova Scotia | 83 | 10 | 81 |
| ANTHRACITE STEAM COALS & COKE. | | | |
| Coke (New England Gas & Coke Co.) | 91 | 9-½ | 89 |
| Lykens Valley Pea | 96 | 15 | 88 |
| " " Buckwheat | 96 | 18 | 85 |
| Wyoming Pea | 95 | 15 | 87 |
| " " Buckwheat | 95 | 18 | 84 |
| Schuylkill Pea | 93 | 15 | 85 |
| " " Buckwheat | 93 | 18 | 82 |
| Lehigh Pea | 91 | 15 | 84 |
| " " Buckwheat | 91 | 18 | 81 |

The boiler tests are full length tests, carefully made on the type of boilers in general use, and with grates suitable for the coke. They indicate a value for the combustible portion of 86 per cent., both when considering the evaporation alone, and

when allowance was made for the information given by gas analysis.

The proximate analysis indicated a value of 92 per cent. and the ultimate analysis indicated a value of 93 per cent., from which figures we have estimated that 91 per cent. was a fair estimate for the evaporative power of the combustible. The percentage of refuse averaged 9½ per cent. in three boiler tests.

Another boiler test showed over 20 per cent. due to unsuitable grates for the size of coke used; but 9½ per cent. appeared to be a fair figure for proper grates, making the evaporative power of the coke 89 per cent. on the basis used in the table.

The capacity of the coke appears to correspond to that of anthracite coal of similar size, and to be about 80 per cent. of the capacity of the best soft coals, such as Cumberland, Pocahontas and New River. By capacity is meant the ability to evaporate steam with a given grate area and draft pressure, irrespective of the economy.

In regard to the behavior of the coke, it was found to clinker slightly in a manner similar to the Dominion coal from which it is made, but nowhere near as badly as some of the pea and buckwheat and anthracite coals frequently used.

## MECHANICAL STOKERS.

BYRON ELDRED, Boston, Mass.

You will all agree with me in the assertion that in the management of a textile mill which depends upon steam for motive power, it pays to devote a good deal of attention to the fire-room. The man behind the shovel is burning up his employer's money. Yet, if left to himself, the fireman seems to care little about this. The economical use of fuel, and the saving of dollars and cents for his employer, seems to give him little concern. Two things appear to be uppermost in the ordinary fireman's mind. Keeping up steam and getting all the rest he can. The first he must do, of course; and the second, if left to himself, he will make every effort to do, forgetful of, and indifferent to, the wasteful use of coal which it causes, and the loss of money to his employer. Not long since I saw a fireman in a large and well-managed mill, throw 34 shovelsful of coal into a furnace at one firing, and then he had an opportunity to rest for half an hour — an instance of the truth of my statement that the fire-room needs the most careful oversight if it is to be economically managed.

The object of mechanical stokers is to perfect the introduction of coal to the furnace, and some think that if the coal is supplied properly by hand-firing, mechanical stokers can show no great economy over a first-class fireman. This is partly right and partly wrong. It depends to some extent upon the kind of comparison, whether a test run for a few hours under special conditions, or a working trial of a number of days under conditions as they exist. A good fireman who is handling the shovel

for a ten-hours' test, knowing that every pound of coal wasted will tell against him in the results, will give his furnaces undivided attention, firing and carefully distributing the fuel at frequent intervals, and thereby securing almost as good efficiency as an ordinary type of mechanical device. But these conditions are not maintained in regular work, for the fireman cannot devote his entire attention to a single boiler as he does on a short trial run, even if he is disposed to do his very best for his employer's interest. It is in the regular operation of a plant of boilers under care of the force of men regularly employed that mechanical firing is advantageous. But even this is not always true, for the result is affected more than all by the class of stoker. Many stokers of the present day, like the original Watt device patented in England in 1785, admit the coal at the front above the grate, and slowly carry it forward toward the bridge-wall. During its passage from front to rear it becomes ignited, burned and consumed, and at the end of its course the ashes and clinkers are deposited. In this class of stoker, which represents the numerous "overfeed" devices on the market, good results can be obtained when carefully handled; but it has been found that much depends upon the operator if the theoretical advantages are substantiated in continuous practice. In these stokers the one great difficulty to be overcome is that which is contended with in hand-firing, viz., the improper distribution of air supplied to the furnace. The greatest amount of air is admitted through a mass of burning coal at points on the grate where the fuel is thinnest. At such points a large supply of air is least needed, for it has the least work to do; and, consequently, much passes in and through the furnace unused. In the stokers mentioned, the fuel is thinnest at the rear end, and here it is mainly coke or a mixture of coke, ash and clinkers. There is, therefore, a double reason why there is a large body of air supplied which is wasted. The fuel is thickest at the front end, and here the most air is needed, but it cannot be supplied in the amount required. It has been found in practice that unless these stokers are carefully watched, so much air goes

through the grates unused that the efficiency is largely impaired.

It will thus be seen that if economy is to be obtained in the firing of coal, either by hand-firing or by the mechanical stokers referred to, the fireman must on the one hand be carefully held up to attentive work, or the stoker must on the other hand be watched so that the object of its use will not be, as so often happens, wholly defeated. In either case the difficulty of securing the desired end is well nigh insurmountable. Let me then introduce to your attention a stoker which will attain the object of good firing without the objections raised against this class of overfeed devices. I refer to the *American Underfeed Stoker*. This stoker is exceedingly simple in construction. It may be considered as a gas producer and burner combined. The methods and principles involved are totally different from those of overfeeding. Fig. 1 shows section of stoker installed under a return tubular boiler. Immediately below the coal hopper is a screw conveyor which carries the coal into the fuel magazine. This fills and overflows on both sides, distributing the burning fuel within the furnace, as shown in Fig. 2. Each stoker is driven independently by a small steam motor located in front of and below the hopper. The coal is fed slowly and continuously, and approaching the fire in its upward course, it is slowly roasted or coked, liberating the gas contained. Every pound of coal fed into the furnace goes through this gas producing process, and there are no open grate bars for fuel to fall through unconsumed into the ash pit. The continuous upward feeding gives a breathing motion to the coke bed within the retort keeping it free and open for the circulation of air. The liberated gas rises from the mass of coking fuel within the retort to mix with air admitted through tuyere or air blocks lying directly underneath the burning fuel. The mixture of air and gas is forced by pressure of air blast of from 1 to 1¾ ounces into the burning mass and ignited. The by-product or coke from this gas-producing process is then burned above the retort. The fuel which has been longest within the stoker is highest above the grate line; consequently, exposed to the most intense

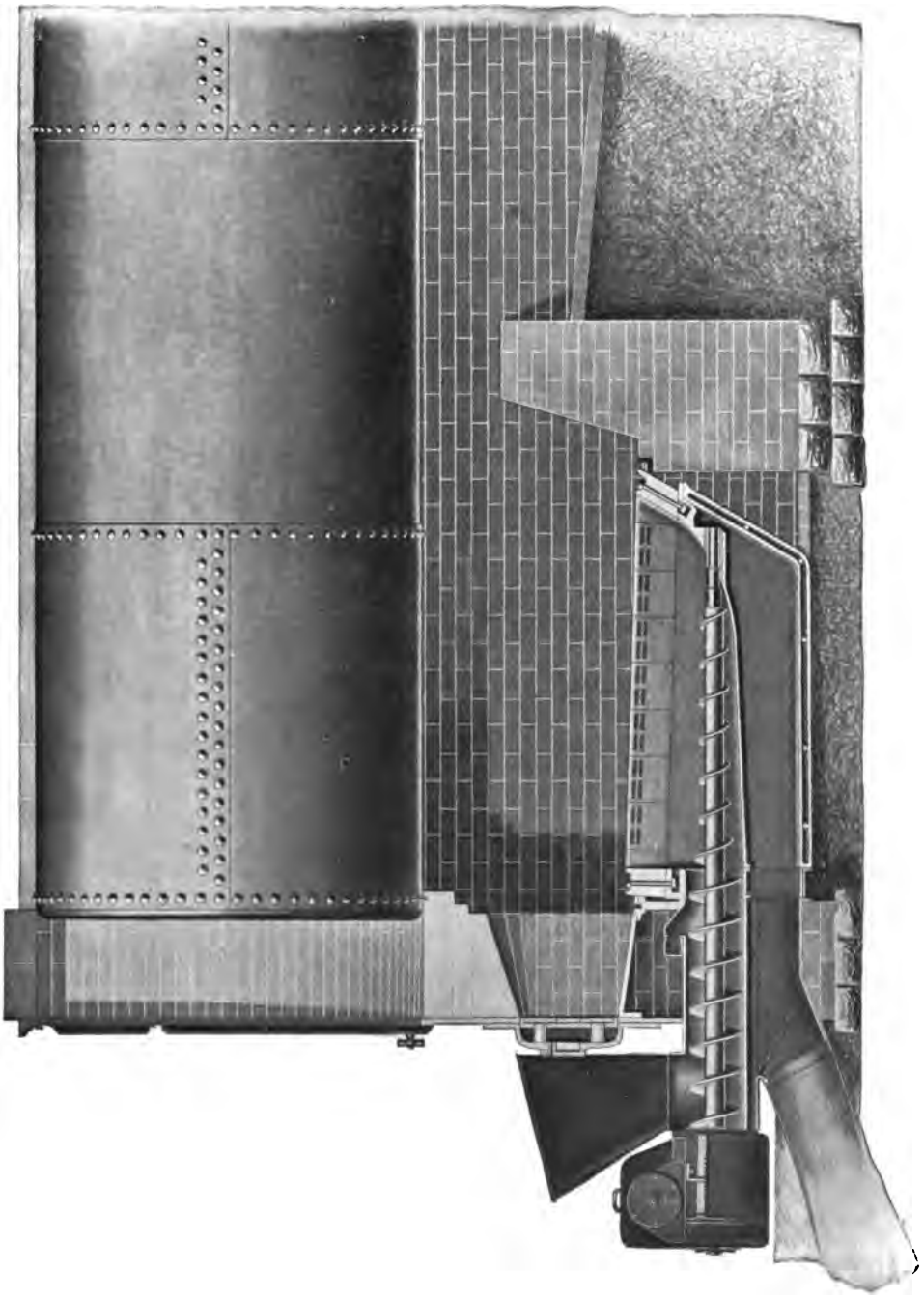


FIG. 1.

FIG. 2.

FIG. 3.

heat. All combustible matter is burned, leaving the refuse to flow down the mound shaped body of fuel, and form homogeneous clinkers on the dead bars which constitute the floor of the furnace. This does away with slicing necessary to maintain air supply in other methods of firing.

The American Stoker has been designed on those principles laid down for improvement in all lines of manufacture. First, the situation was analyzed. Bituminous or gas-producing coal was to be converted into heat. The fuel consisted of two principle elements—volatile matter and fixed carbon. These do not burn to the best advantage under the same conditions. The gas requires an immediate and sufficient supply of oxygen, while the fixed carbon is not as free burning and wasteful in process of combustion. The principles involved in the construction of the underfeed stoker provide that the air supply first reaches the gas, and combustion is improved to such an extent that smoke, the product of imperfect combustion, is conspicuous by its absence. Owing to the fact that the air supply to a furnace equipped with an American Stoker is admitted above the coking fuel and directly underneath the burning fuel, all air furnished goes to support combustion. For this reason, not much more than one-half the usual amount of air is necessary. This produces a higher temperature, and a much reduced volume of heated gases leaving the combustion chamber. The reduced volume causes a slower travel toward the stack, giving the water in the boiler a better chance to absorb the heat contained in these gases for useful evaporation. In the appended reports of boiler trials made at the Tremont & Suffolk Mills, and the Riverside Paper Mills, by the well-known expert, Mr. GEO. H. BARRUS of Boston, I will call your attention particularly to the difference in the temperatures of flue gases under hand and stoker fired conditions as a proof of this statement.

Smokeless operation and mechanical draft attending the installation of American Stokers do away with the necessity of a stack higher than ten (10) feet above the surrounding buildings. This fact is much appreciated by those installing new

plants, and those who suffer annoyance from insufficient stack draught. The smokeless qualities of the American Stoker have afforded no small amount of satisfaction to our customers manufacturing fine fabrics, and operating bleacheries.

The saving of fuel is of course the prime object sought in making changes in a steam plant. It is safe to say that of the hundreds of American Stokers in use, the majority are effecting a saving of over twenty per cent. (20%) as against previous hand-firing results, and there are few if any plants where at least a ten per cent. (10%) increased evaporation cannot be effected by the installation of American Stokers.

Figure 4 shows method of elevating coal which is discharged directly into stoker hoppers, as shown in Figure 5, an arrangement which effects a material saving of labor. Figures 6, 7, 8 and 9 show stokers applied to various types of boilers in several well-known plants.

FIG. 4.

BOILER HOUSE OF THE ARBUCKLE BROS. SUGAR REFINERY BROOKLYN, N. Y.
23 300 H. P. B. & W. BOILERS EQUIPPED WITH THE AMERICAN STOKER.

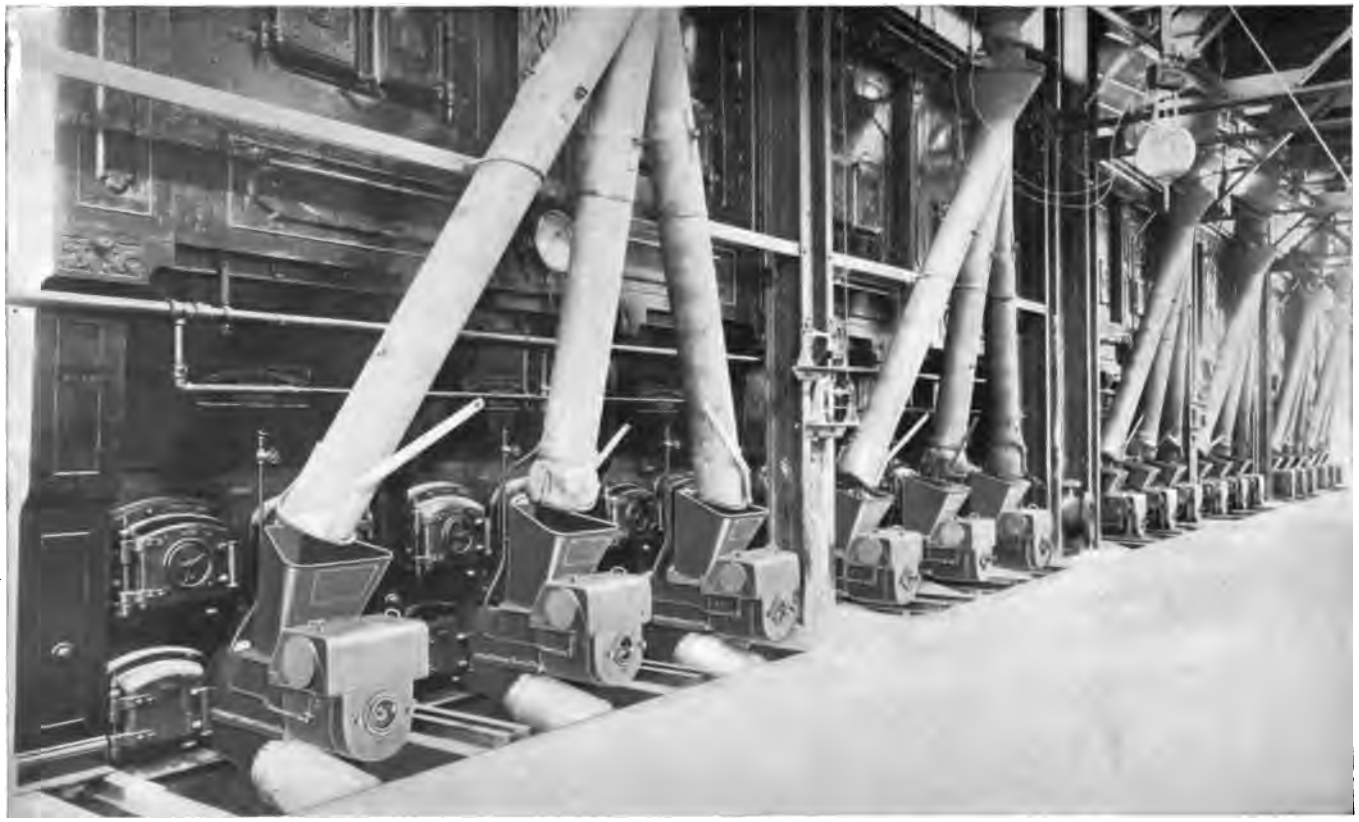


FIG. 5.

KINGS COUNTY ELECTRIC LIGHT, HEAT AND POWER CO., BROOKLYN, N. Y. SIX 500 H. P. STERLING BOILERS EQUIPPED WITH THE AMERICAN STOKER.

FIG. 6.

TREMONT AND SUFFOLK MILLS, LOWELL, MASS. SUFFOLK MILL BOILER HOUSE. FOUR 84 INCH CORLISS BOILERS WITH AMERICAN STOKERS. AT THE TREMONT MILL WE HAVE A SIMILAR INSTALLATION OF SIX STOKERS.

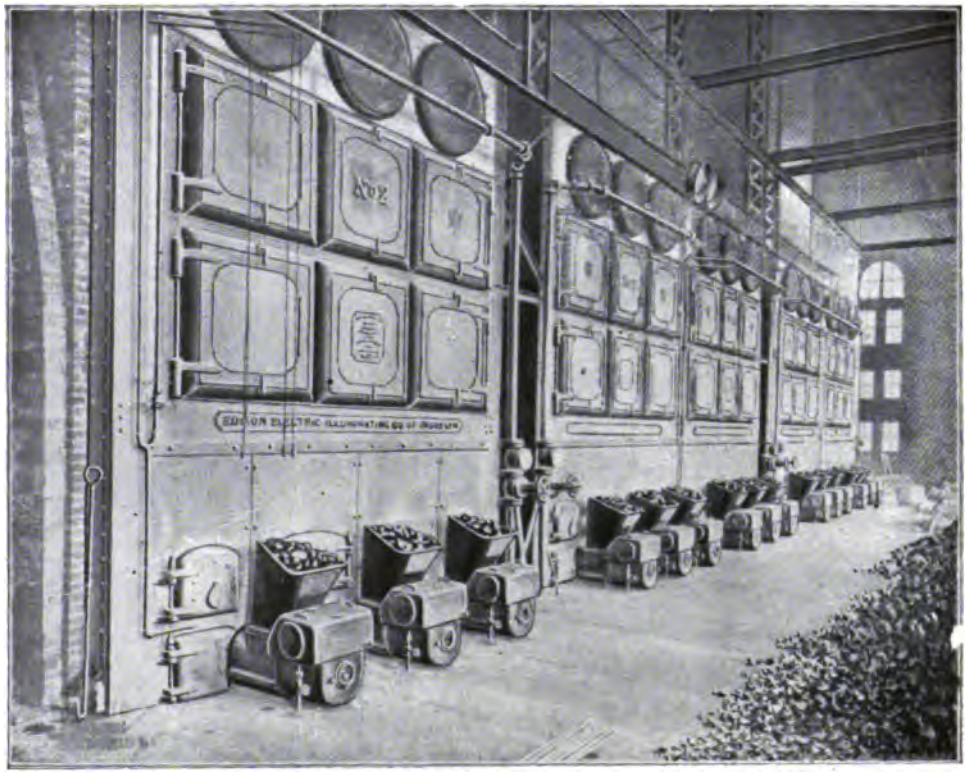


FIG. 7.

BOILER ROOM AT THE UNION STATION OF THE EDISON ELECTRIC ILLUMINATING CO., OF BROOKLYN, N. Y. 500 HORSE POWER CAHILL B. & W. TYPE WITH AMERICAN STOKERS. ONE OF THE LARGEST ELECTRICAL POWER PLANTS IN THE WORLD.

FIG. 8.

THE SHOENBERGER STEEL CO., PITTSBURG, PA. "TWO FLUE" BOILERS EQUIPPED WITH THE AMERICAN STOKER.

FIG. 9.

CARNEGIE STEEL CO., HOMESTEAD MILLS, MUNHALL, PA. AN INSTALLATION UNDER 24 "TWO FLUE" BOILERS. WE HAVE JUST COMPLETED AN INSTALLATION OF 28 STOKERS IN ADDITION TO THE 24 SHOWN.

## DATA AND RESULTS OF EVAPORATIVE TESTS ON FOUR CORLISS VERTICAL 84 INCH BOILERS AT TREMONT & SUFFOLK MILLS, LOWELL, MASS.

Grate Surface . . . . . 132.7 sq. ft.
Water Heating Surface . . . . . 5,848.0 "
Steam Heating Surface . . . . . 2,095.0 "

| | | New River | |
|---|---|---|---|
| Kind of coal | | | |
| Percentage of moisture in coal | per cent. | 3.5 | 0.7 |
| System of firing | | Hand firing | Stoker firing |
| Date, 1898 and 1899 | | Oct. 7 | Jan. 10 |
| **TOTAL QUANTITIES.** | | | |
| Duration | hrs. | 10 | 10.6 |
| Weight of dry coal consumed | lbs. | 27,470 | 22,829 |
| Weight of ashes, clinkers and refuse | | 1,633 | 1,474 |
| Percentage of ashes, clinkers and refuse | per cent. | 5.9 | 6.5 |
| Weight of water evaporated, not corrected for superheating | lbs. | 229,731 | 221,806 |
| **HOURLY QUANTITIES.** | | | |
| Coal consumed per hour | lbs. | 2,747 | 2,153.7 |
| Coal per hour per sq. ft. of grate | lbs. | 20.2 | . . . |
| Water evaporated per hour, not corrected for superheating | lbs. | 22,991.5 | 20,973 |
| Equivalent evaporation per hour, feed 100°, pressure 70 lbs., corrected for superheating | lbs. | 24,336.5 | 22,483 |
| Horse-power developed, A. S. M. E. basis of 30 lbs. | H. P. | 811.2 | 749.4 |
| Equivalent evaporation per sq. ft. of water heating surface per hour | lbs. | 4.2 | 3.9 |
| **AVERAGE OF OBSERVATIONS, ETC.** | | | |
| Average boiler pressure | lbs. | 110.5 | 107.9 |
| Average temperature of feed water | deg. | 66.3 | 44.4 |
| Average temperature of gases in main flue | deg. | 451 | 409 |
| Average draught section | in. | .42 | .2 |
| Degrees of superheating in No. 2 boiler | deg. | 47 | 34 |
| Weather and outside temperature | | Clear, moderate | Clear, cold |
| Total heat of combustion per lb. of dry coal B. T. U. | | . . . | 14,543 |
| Total heat of combustion per lb. of combustible, B. T. U. | | . . . | 15,357 |
| **RESULTS.** | | | |
| Water evaporated per lb. of dry coal, not corrected for superheating | lbs. | 8.363 | 9.716 |
| Equivalent evaporation per lb. of dry coal from and at 212°, corrected for superheating | lbs. | 10.173 | 11.97 |
| Equivalent evaporation per lb. of combustible from and at 212°, corrected for superheating | lbs. | 10.822 | 12.797 |
| Efficiency based on combustible | per cent. | . . . | 80.5 |

COMPARATIVE TEST ON TWO 237 H. P. B. & W. BOILERS AT RIVERSIDE PAPER CO., HOLYOKE, MASS.

| | | Hand Fired. | Stoker Fired. |
|---|---|---|---|
| Date of test | | Aug. 16, 1898 | Sept. 27, 1898 |
| Duration of test | hrs. | 11 | 11 |
| Heating surface | sq. ft. | 4,470 | 4,470 |
| Steam pressure by gauge | lbs. | 87.7 | 91.1 |
| Temperature of feed water | °F. | 143.5 | 115.2 |
| Temperature of flue gases | °F. | 592 | 464 |
| Kind of coal used | | Bloomington | Bloomington |
| Total dry coal consumed | lbs. | 17,705 | 14,869 |
| Total refuse | lbs. | 1,428 | 906 |
| Refuse | per cent. | 8.1 | 6.1 |
| Total combustible | lbs. | 16,277 | 13,963 |
| Total water evaporated | lbs. | 160,838 | 159,188 |
| Water evaporated per pound of dry coal from and at 212° F. | lbs. | 10.070 | 12.191 |
| Water evaporated per pound of combustible from and at 212° F. | lbs. | 10.957 | 12.983 |
| Equivalent water evaporated per square foot heating surface per hour | lbs. | 2.98 | 3.02 |
| Horse-power developed A. S. M. E. basis of 30 pounds H. P. | | 470.2 | 478 |
| Per cent. of increased evaporation per pound of coal | | | 21. |

TOPICAL QUESTIONS.

134. Is it advisable to warm picker rooms with air drawn from the main mill?

No discussion.

135. Are automatic heat regulators an advantage both in economy and comfort?

No discussion.

136. What is the best method of cleaning mill windows?

No discussion.

137. What methods have been successfully employed to diminish smoke from mill chimneys?

Mr. OSCAR ELSAS. Under topical question 137 all the manufacturers find a good deal of serious thought. The question of diminishing smoke from mill chimneys is an important one in two ways. In the first place, smoke shows clearly, poor combustion, therefore, a waste of energy. Secondly, it is very annoying, particularly in cities, as is evidenced by a number of attempts at legislating against it.

After thoroughly investigating to overcome this trouble, we adopted in our plant the Hawley Down Draft Furnace. The success of the furnace depends entirely upon the coking qualities of the coal, and heating the air to such a point that when it strikes the lower grate it is in a fit condition for perfect combustion.

The down draft double grate system, consists of two grates, one above the other. The upper, or water grate, is made of soft iron tubes, slightly inclined, and steel drums containing fast circulating water from the boilers. On this grate rests a bed of four inches to six inches of incandescent coal. The common grate below also carries a bed of incandescent coal. The gases from the fresh coal thrown in on the upper grate are turned down through this upper incandescent bed of coal, and then

dragged over a similar bed on the lower grate. Thus you get two excellent chances at the volatile gases, and two chances at the carbon of the coal before the refuse reaches the ash pit. All air is passed down through the upper bed of fire, or up through the lower fire, and no cold air can reach the combustion chamber. This naturally leads to good combustion and economy.

If this apparatus is handled properly, and according to the directions of the Hawley Down Draft Company, the result will be that 90 per cent. of the smoke can be obviated, and furthermore, that the flue gases are anywhere from 300 degrees to 500 degrees lower than under average conditions of common furnaces.

At the present time there are about 4000 of these furnaces in use in the United States, or an equivalent of 600,000 horse power. I understand that there have been introduced in the past 90 days over 250 of these furnaces. Included among this number is the contract to equip the Boston Electric Light Company's complete plant.

In a very short time all the public buildings under the jurisdiction of the Treasury Department at Washington, will have been equipped with these furnaces, primarily to obviate smoke, and a contract has just been made by the commissioners of the District of Columbia to equip their pumping station on U street.

In a number of tests made by different mechanical engineers, I understand that the amount of carbon actually contained in dense smoke is only $\frac{44}{100}$ of one per cent. However, this slight amount of carbon mixed with oxygen in the form of carbon dioxide produces the immediate trouble that this article hopes to overcome.

The great short-coming of the common grate setting is, that with firing the doors must be kept open, and this, in connection with the fresh coal thrown in, absorbs much of the heat and chills the gases, making good combustion impossible.

In practice, in the use of the Hawley furnace, it is found that the upper grate does 90 per cent. of the work. Under normal

conditions where the boilers are not crowded, no fuel is thrown on the lower grate, and the only fuel used on this grate is the incandescent coal, which drops down from the upper grate after the fireman runs his slice bar through the coal.

A very interesting test was made in Philadelphia by Whitham & Johnson showing the percentage of smoke from common furnaces as compared with the Hawley furnace. I herewith attach a copy of this test for your perusal.

An objection that can be raised to this furnace is where the boilers have not sufficient chimney. It has been found that reversing the path of the gases requires a trifle more draft than the ordinary passage of gases.

Another objection to this furnace would be where the water contains a good deal of solid matter, as the water grates are composed of two-inch tubes;—for in such a case there would be a certain amount of danger of their becoming closed up by incrustation.

However, we have had these grates in use since October, 1895, and have had no trouble, and placed our second contract on February 23, 1898. We now have 1500 horse power boilers equipped with these furnaces, and they have lived to their guarantee in every respect, that is, to prevent 90 per cent. of the smoke, to save 10 per cent. in the cost of fuel over any device or setting, and increase the capacity of the boilers 60 per cent. over its rating.

The following are the smoke determinations to which reference was made above:

No standard method for determining or recording the smoke discharge from a chimney has been adopted by mechanical engineers, or formally advised by any engineering society, or recognized by users of power, although various methods have been offered. The most available method is one in which the discharge from the chimney is continuously observed and reduced to some basis of comparison. Evidently dense black smoke, or else a clear stack, must be the unit or basis of reference.

Smoke is carried various distances before separating according to its density, etc. Thus, if a trace of smoke is carried only 50 feet from the chimney, while dark, black smoke is carried 400 feet, it would not be proper to say that a trace of smoke is ⅛ as objectionable as is the heavy black smoke, because the trace is not nearly as great in quantity as is the dense discharge.

It has been our practice, for some time, to make four grades of smoke, as follows, the distances referring to the spaces covered by the smoke before separating:

Dense black smoke carries from 200 to 400 feet.
Moderate black smoke carries from 100 to 200 feet.
Gray smoke carries from 20 to 100 feet, and
Trace of smoke carries from 0 to 20 feet.

A dense, black smoke will carry as above before separating, and is so thick that the sky is not visible through it.

Moderate black smoke is not nearly as dense as is the former, and the sky is visible in "patches" through it.

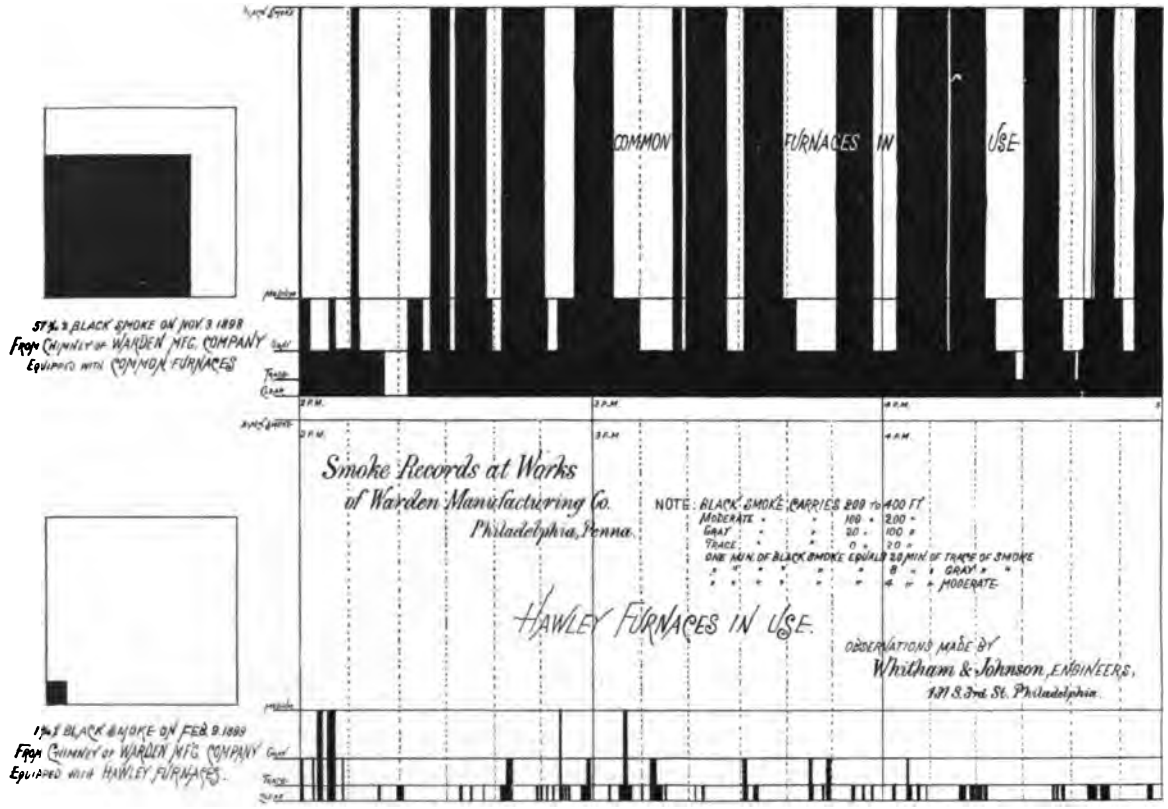
The gray smoke is "salt and pepper color", and is less dense than the former.

Considering the carrying distances and densities of these grades of smoke, we have adopted the following scale, which is available for reductions, is simply an application, and easily remembered:

| | |
|---|---|
| Dense black smoke, | 1 |
| Moderate black smoke, | ¼ |
| Gray smoke, | ⅛ |
| Trace of smoke, | $\frac{1}{20}$ |

In figures 1 and 2, the heights are divided in accordance with the above scale, and horizontal distances represent time in hours. The black and white areas in these diagrams show respectively the equivalent dense black smoke discharges and the periods of clear stack.

The diagrams illustrate continuous smoke tests made and plotted in the manner already described. They represent the appearance of the chimney of the Warden Manufacturing Co., of


COMMON FURNACES IN USE.
Smoke Records at Works
of Warden Manufacturing Co.
Philadelphia, Penna.
NOTE: BLACK SMOKE CARRIES 200 to 400 FT
MODERATE " " 100 " 200 "
GRAY " " 20 " 100 "
TRACE " " 0 " 20 "
ONE MIN. OF BLACK SMOKE EQUALS 2.0 MIN OF TRACE OF SMOKE
" " " " " " 8 " " GRAY " "
" " " " " " 4 " " MODERATE
HAWLEY FURNACES IN USE.
OBSERVATIONS MADE BY
Whitham & Johnson, ENGINEERS,
171 S. 3rd St. Philadelphia.
2 P.M.
3 P.M.
4 P.M.

57% BLACK SMOKE ON NOV 3 1898
FROM CHIMNEY OF WARDEN MFG. COMPANY
EQUIPPED WITH COMMON FURNACES

1% BLACK SMOKE ON FEB 9 1899
FROM CHIMNEY OF WARDEN MFG. COMPANY
EQUIPPED WITH HAWLEY FURNACES.

Philadelphia, in November, 1898, and in February, 1899. The plant consists of 5—150 horse power, Heine boilers. The November test was made when the boilers were operated with common grates. The February test was made after the application of the Hawley Down Draft Furnaces. Beech Creek semi-bituminous coal was burned. The observations were timed with a stop-watch, and continued over a period of three hours in each instance. The observations may be grouped as follows:

| Smoke. | Common Furnaces. | Hawley Furnaces. |
|---|---|---|
| Dense black, | 89 9 min. | 0.00 min. |
| Moderate black, | 24.2 " | 0.93 " |
| Gray, | 56.4 " | 6.80 " |
| Trace, | 2.5 " | 26.15 " |
| Clear stack, | 7.0 " | 146.12 " |
| Total, | 180.0 min. | 180.00 min. |

Reducing these grades of smoke to dense black as a standard, in the manner already noted, we have:

| Smoke. | Common Furnace. | Hawley Furnace. |
|---|---|---|
| Dense black observed, | 89.90 min. | 0.00 min. |
| Moderate reduced, | 8.05 " | 0.23 " |
| Gray reduced, | 7.05 " | 0.85 " |
| Trace reduced, | 0.12 " | 1.31 " |
| Total equivalent dense black, | 103.12 min. | 2.39 min. |

It thus appears that the equivalent dense black smoke discharged from the chimney with common furnaces in use was 103.12 minutes out of 180 minutes, or 57.3 per cent. of the time; while with the Hawley furnace it aggregated 2.39 minutes or 1.3 per cent. of the time.

TOPICAL QUESTIONS.

138. What is the best method of introducing kerosene oil into boilers, and what have been the results from its use?

No discussion.

139. Do water tube boilers contain advantages for steam plants in mills.

No discussion.

140. Do separators remove enough of the oil from condensed steam to prevent all injury to the boilers?

No discussion.

The PRESIDENT. As this concludes the programme, I now declare the sixty-seventh meeting of the New England Cotton Manufacturers' Association adjourned.

# INDEX.


A

Active Members, List of . . . . 13
Active Members, Election of . . 77
Adjournment of Montreal Meeting . . . . . 94
Advantuges of Coke, Arthur C. Freeman . . . . . 237
Alsace, Germany, Textile Association at . . . . . 81
Amendment to Charter . . . . 4
Americon Cotton Bale . . . . . 183
Ashworth, J. J., Electric Power Transmission Plant at Valleyfield . . . . . 221
Ashworth, J. J., Resolution of Thanks to . . . . . 93
Associate Members, List of . . 27
Associate Members, Election of 78
Atlanta Meeting . . . . . 97
Average Number of Yarn, Formula for . . . . . 136
Ayer, A. A., Address of Welcome 69
Ayer, A. A., Resolution of Thanks to . . . . . 91

B

Baling, Cost of . . . . . 195
Barrett, Hon. John, Minister to Siam . . . . . 104
Barrus, Geo. H., Report of Boiler Trials . . . . . 257
Beach, Edward C., Elected an Active Member . . . . . 77
Bees Smuggling honey . . . . . 220
Billy Goat . . . . . 99
Board of Government . . . . . 9
Bobbins . . . . . 203
Boiler Tests by Geo. H. Barrus . 257
Brooks, Christopher P., Committee on Election of Members . 76
Brooks, Christopher P., Committee on Standard Yarn Numbering . . . . . 82
Brooks, Christopher P., Standard of Yarn Numbering . . . . . 79
Brooks, Christopher P., Textile Education by Mail . . . . . 142
Brundage, Percy H., Elected an Associate Member . . . . . 78
Buildings, Methods of Appraisal 111
Bush, Arthur R., Resolution of Thanks to . . . . . 93

C

Call to Montreal Meeting . . . 59
Canadian Colored Cotton Mills Co., Vote of Thanks to . . . 90
Canadian General Electric Co., Resolution of Thanks to . . . 93
Chalmers, James C., Elected an Active Member . . . . . 77
Charlotte, N. C., Meeting at . . 97
Charter . . . . . 3
Charter Amendment . . . . . 4
Cheesman, J. E., Cotton Ginning 160
Cheesman, J. E., Elected an Associate Member . . . . . 78
China, Trade of . . . . . 101

Chinese Trade, W. S. Granger . 107
Churka Gin . . . . . 162
Clarke, Frederick E., Biography of . . . . . 50
Clarke, Frederick E., on Costs of Weaving . . . . . 138
Clarke, Frederick E., President's Address . . . . . 71
Clarke, Frederick E., Response to Mayor of Montreal . . . . 67
Clarke, Frederick E., on Subdivision of Overseers . . . . . 140
Coke, Manufacture of . . . . . 238
Committee on Election of Members . . . . . 76
Committee on Standard Yarn Numbering . . . . . 82
Constitution and By-Laws . . . 5
Consular System . . . . . 103
Correspondence Schools . . . . 142
Costs of Manufacture, James G. Hill . . . . . 132
Cost of Subdivisions of Manufacturing . . . . . 134
Cottage Saw Gin . . . . . 162
Cotton Fabrics, Improvements in 73
Cotton Gin of Eli Whitney, M. F. Foster . . . . . 152
Cotton Ginning, J. E. Cheesman 160
Cotton Market Quotations . . . 76
Cowan, C. C., Elected an Associate Member . . . . . 78
Cox, Thomas G., Resolution of Thanks to Guests Contributing Papers . . . . . 93
Cracked Bobbins, Cause of Stains 210

D

Dederick Bale, by W. H. Perkins 188
Dennett, Charles W., on Costs of Weaving . . . . . 139
Dennett, Charles W., on Valuation of Manufacturing Property for Taxation . . . . . 123
Dennett, Charles W., on Organization of Overseers . . . . . 140
Depreciation of Machinery . . . 114
Domestic Trade, the Revolution of . . . . . 101
Dominion Cotton Co., Vote of Thanks to . . . . . 90
Double Roving . . . . . 205
Down Draft System . . . . . 259
Draper, George O., Improvements in Machinery . . . . . 141
Drying Textile Fabrics with the Assistance of a Vacuum, Chas. H. Fish . . . . . 212
Dunham, Joseph M., on the Dederick Bale . . . . . 194
Dunham, Joseph M., on Extent of Overseers' Work . . . . . 139
Dunham, Joseph M., on Improvements in Machinery . . . . . 141
Dunham, Joseph M., Resolution of Thanks to Mayor of Montreal 93

E

Early History of Cotton . . . . 160
Eaton, Russell W., Oiling Fly Frame Spindles . . . . . 209
Economy of Using Turbines at Full Gate, Frank P. Vogl . . 234
Election of Members . . . . . 77
Electric Power Transmission Plant at Valleyfield, J. J. Ashworth . . . . . 221
Eldred, Byron, Mechanical Stokers . . . . . 242
Byron, Eldred, Resolution of Thanks to . . . . . 93
Elements of Value of Mill . . . 109
Elsas, Oscar, on Smoke from Mill Chimneys . . . . . 259
Evaporative Power of Coals and Coke . . . . . 240
Evaporation Tests . . . . . 257
Exceptions in Taxable Value . . 109

Excursion to Mount Royal . . . 75
Export Trade, D. A. Tompkins 96

F

Felton, Mrs. D. D., on Ladies' Committee . . . . . 75
Ferguson, James T., Elected an Active Member . . . . . 77
Fifth Session . . . . . 88
Firing of Boilers with Coke . . 239
First Commerce in Cotton . . . 161
First Session . . . . . 59
Fish, Chas. H., Drying of Textile Fabrics with the Assistance of a Vacuum . . . . . 212
Fleury, Monsieur P., Secretary Congress on Yarn Numbering 79
Fly Frame Spindles, Oiling of, Russell W. Eaton . . . . . 209
Formula for Average Number of Yarn . . . . . 136
Foster, M. F., Eli Whitney and his Cotton Gin . . . . . 152
Fourth Session . . . . . 88
Freeman, Arthur C., Advantages of Coke . . . . . 237

G

Gault, A. F., Address of Welcome 68
Gault, A. F., Resolution of Thanks to . . . . . 91
General Electric Co., Resolution of Thanks to . . . . . 93
Ginning Cotton, J. E. Cheesman 160
Goodall, Louis B., Elected an Active Member . . . . . 77
Gould, Sumner S., Elected an Associate Member . . . . . 78
Granger, W. S., Discussion on Export Trade . . . . . 107
Greene, Mrs. General, Encouragement of Whitney's Invention of Cotton Gin . . . . . 157
Greenwood, S., Elected an Active Member . . . . . 77
Guests at Montreal Meeting . . 56
Gulliver, Arthur H., Discussion on Textile Instruction by Mail 148
Gulliver, Arthur H., Spinning Fine Yarn on a Filling Frame 202

H

Hammond, W. B., Elected an Associate Member . . . . . 78
Hawley Down Draft Furnace . . 260
Her Majesty's Theatre Party . . 75
Hill, James G., Computing Costs of Manufacture . . . . . 132
Hill, Col. Jerome, on the Lowry Bale . . . . . 181
Holt, George W., Committee on Election of Members . . . . 76
Honorary Members, List of . . 13
Hosts at Montreal . . . . . 66
Hosts at Montreal, Thanks to . . 90
Humidity in Spinning Room . . 205

I

Improvements in Cotton Fabrics 73
Improvements in Machinery . . 141
Incorporation . . . . . 3
In Memoriam . . . . . 49
Instruction, Textile, by Mail, C. P. Brooks . . . . . 142
International Congress of Technical Education . . . . . 79
Iron Commerce . . . . . 100

K

Kendrick, John E., Elected an Associate Member . . . . . 78
Kenny, Frank B., Elected an Associate Member . . . . . 78
Kerr, Nathaniel B., Committee on Standard Yarn Numbering 82

Kerr, N. B., on Standard Yarn Numbering . . . . . 81
Kids . . . . . 99
Knight, Stephen A., Chairman Pro Tem . . . . . 151
Knight, Stephen A., Discussion on the Valuation of Manufacturing Property for Taxation . 123
Knight, S. A., On Injury to Cotton by Ginning . . . . . 176
Knight, Stephen A., on the Round Bale . . . . . 191

L

Lacey, Fred, Permanence of Electric Motors . . . . . 231
Lacey, Fred, Resolution of Thanks to . . . . . 91
Ladies' Committee . . . . . 75
Land Valuation . . . . . 117
Local Committee at Montreal . . 66
Local Committee, Resolution of Thanks to . . . . . 91
Lovering, Hon. William C., on the Roundlap Bale . . . . . 183
Lowe, Arthur H., Committee on Standard Yarn Numbering . . 82
Lowe, Arthur H., on Costs of Weaving . . . . . 138
Lowe, Arthur H., Discussion on Textile Instruction by Mail . . 149
Lowe, Arthur H., Discussion on Valuation of Manufacturing Property for Taxation . . . . 123
Lowe, Arthur H., on Ginning of Cotton . . . . . 174
Lowe, Arthur H., Resolution of Thanks to Hosts at Montreal . 90
Lowe, Arthur H., on Standard Yarn Numbering . . . . . 82
Lowe, Mrs. Arthur H., on Ladies' Committee . . . . . 95
Lowry Round Bale . . . . . 181

M

MacCarthy Gin . . . . . 170
Mail, Textile Education by, C. P. Brooks . . . . . 142
Main, Charles T., Discussion on Valuation of Manufacturing Property for Taxation . . . . 130
Main, Charles T., Valuation of Manufacturing Property for Taxation . . . . . 108
Manufactured Exports . . . . . 100
Manufacturing Property, Valuation of for Taxation, Charles T. Main . . . . . 108
Mayor's Address, Montreal . . 66
Mayor of Montreal, Resolution of Thanks to . . . . . 93
McFadden, Geo. H. & Bros., Cotton Market Quotations . . 76
McFadden, Geo. H. & Bros., Resolution of Thanks to . . . 92
Meats, John T., on Spinning Fine Yarns . . . . . 207
Mechanical Stokers, Byron Eldred . . . . . 242
Members, Alphabetical List of . 13
Members, Election of . . . . . 77
Membership, Geographical List of 32
Membership, Location of . . . 47
Membership, Number of . . . . 31
Montreal Cotton Co., Vote of Thanks to . . . . . 90
Montreal, Mayor's Address . . 66
Montreal Mayor, Resolution of Thanks to . . . . . 93
Montreal Meeting . . . . . 53
Montreal Meeting, Adjournment of . . . . . 94
Montreal Meeting, Call to . . . 59
Montreal Meeting, Programme of 62
Merchants' Cotton Co., Vote of Thanks to . . . . . 90
Methods of Appraising Value of Mill . . . . . 110

Mount Royal, Excursion to . . . 75
Machinery, Depreciation of . . 114

N

Nicaragua Canal . . . . . 102
Nixon, William H., Elected an Active Member . . . . . 77
Northrop Loom . . . . . 72

O

Obligations Abroad . . . . . 100
Officers from First Organization 10
Oiling Fly Frame Spindles, Russell W. Eaton . . . . . 209
Owen, Herbert W., Elected an Active Member . . . . . 77

P

Packing Round Bales on Shipboard . . . . . 182
Papers Read at Montreal Meeting 62
Parker, Walter E., Discussion on Valuation of Manufacturing Property for Taxation . . . . 125
Parker, Walter E., on Subdivision of Overseers . . . . . 140
Past Officers . . . . . 10
Perkins, W. H., The Dederick Bale . . . . . 188
Perkins, W. H., Resolution of Thanks to . . . . . 93
Pierce, Albert R., Elected an Active Member . . . . . 77
Powers, J. F., Elected an Active Member . . . . . 78
Prefontaine, Hon. Raymond, Mayor of Montreal . . . . . 66
Present at Montreal Meeting . . 53
President's Address, Frederick E. Clarke . . . . . 71
Prest, John E., Cost of Baling . 195
Prest, John E., Discussion on Valuation of Manufacturing Property for Taxation . . . . 123
Prest, John E., on Influence of Ginning on Grading Cotton . 177
Prest, John E., on Sub-division of Overseers . . . . . 140
Proceedings . . . . . 53
Programme of Montreal Meeting 62
Public Ginneries . . . . . 179
Purchase of Whitney's Patent by South Carolina . . . . . 158

R

Renfrew, L. B., Elected an Active Member . . . . . 78
Report of Committee on Yarn Numbering . . . . . 92
Response to Mayor of Montreal . 67
Rhodes, Peleg A., Elected an Associate Member . . . . . 78
Richardson, Charles H., Resolution of Thanks to General Electric Co. . . . . 93
Ring Spindles, Improvements in 72
Riverside Paper Co., Boiler Tests 258
Rocky Creek, Site of Whitney's Original Experiments . . . . 157
Roller Gin . . . . . 161
Round Bale, Louis Simpson . . 178

S

Sampling Cotton . . . . . 195
Sampling of Dederick Bale . . . 190
Sampling of Round Bale . . . . 185
Sawyer, Inventor of Improvements in Frame Spindles . . 72
Searles, John E., Elected an Associate Member . . . . . 78
Second Session . . . . . 83
Shafting, Depreciation of . . . 116
Shaking Bars for Coke . . . . . 239
Shepard, Leander, Method of Oiling Fly Frame Spindles . . . 211
Simpson, Louis, on Ginning of Cotton . . . . . 175
Simpson, Louis, The Round Bale 178

Simpson, Louis, Resolution of Thanks to . . . . . 91
Simpson, Louis, on the Square Bale . . . . . 192
Smoke from Chimneys . . . . . 259
Smoke, Freedom from, in Coke . 238
Smoke Talk . . . . . 86
Smoke Talk at Temple Club . . 86
Smoke Test, Diagram of . . . . 263
South Carolina, Purchase of Whitney's Patent . . . . . 158
Southern Cotton Manufacturing to Chinese Trade . . . . . 105
Spencer, S. S., on Valuation of Manufacturing Property for Taxation . . . . . 129
Spencer, S. S., Resolution of Thanks to Geo. H. McFadden & Bros. . . . . 92
Spindles, Speed of . . . . . 204
Spinning Rings . . . . . 203
Henry B. Sprague, Elected an Active Member . . . . . 78
Spinning Fine Yarn on a Filling Frame, Arthur H. Gulliver . . 202
Stains on Cloth . . . . . 209
Steam, Generation of, by Coke . 237
Steele, Geo. F., on Electric Power Transmission . . . . . 230
Steele, Geo. F., Resolution of Thanks to . . . . . 93
Stokers, Mechanical, Byron El-Dred . . . . . 242
Straw, Hon. Ezekiel A., First President . . . . . 71
Subdivision of Overseers . . . . 139
Supervision of Spinning Room . 202
Supplies, Value of . . . . . 116
Systematic Method of Costs for Weaving . . . . . 138

T

Tablet Proposed to Eli Whitney 157
Taft, Edward P., Biography of . 49
Tariff on Electricity . . . . . 219
Taxes on Baling Machines . . . 180
Technical Education, International Congress of . . . . . 79
Temple Club, Programme and Smoke Talk . . . . . 86
Temple Club, Smoke Talk at . . 75
Textile Association at Alsace, Germany . . . . . 81
Textile Fabrics, Drying of, with the Assistance of a Vacuum, Chas. H. Fish . . . . . 212
Textile Instruction by Mail, C. P. Brooks . . . . . 142
Third Session . . . . . 85
Tolman, James P., Valuation of Manufacturing Property for Taxation . . . . . 126
Tompkins, D. A., Export Trade 96
Tompkins, D. A., Resolution of Thanks to A. F. Gault and A. A. Ayer . . . . . 91
Topical Questions at Montreal Meeting . . . . . 62
Topical Question 117 . . . 79–138
Topical Question 118 . . . 79–139
Topical Question 119 . . . 79–141
Topical Question 120 . . . 84–199
Topical Question 121 . . . 84–199
Topical Question 122 . . . 84–200
Topical Question 123 . . . 84–200
Topical Question 124 . . . 84–200
Topical Question 125 . . . 84–200
Topical Question 126 . . . 85–208
Topical Question 127 . . . 85–208
Topical Question 128 . . . 85–208
Topical Question 129 . . . 86–211
Topical Question 130 . . . 86–219
Topical Question 131 . . . 86–219
Topical Question 132 . . . 88–236
Topical Question 133 . . . 89–236
Topical Question 134 . . . 89–259
Topical Question 135 . . . 89–259
Topical Question 136 . . . 89–259
Topical Question 137 . . . 89–259

Topical Question 138 . . . 89–266
Topical Question 139 . . . 89–266
Topical Question 140 . . . 89–266
Tucker. George E., on Valuation of Manufacturing Property for Taxation . . . . . 128
Tremont & Suffolk Mills, Boiler Test . . . . . 257
Turbines, Economy of, at Full Gate . . . . . 234

V

Vacuum, Drying of Textiles with, Chas H. Fish . . . . . 212
Valleyfield, Electric Power Trans-Mission Plant . . . . . 221
Valleyfield, Excursion to . . 75–232
Valuation of Manufacturing Property for Taxation, Charles T. Main . . . . . 108
Various Systems of Computing the Costs of Manufacture, James G. Hill . . . . . 132
Vogl. Frank P., Economy of Us ing Turbines at Full Gate . . 234

Y

Yarn Numbering, Report of Committee on . . . . . 92
Yarn Numbering, Standard of . . 79
Yarn Numbering, Varying Standards of . . . . . 80

W

Walton, W., Report on Cotton Ginning . . . . . 161
Ware, Justin A., Discussion on Valuation of Manufacturing Property for Taxation . . . . 127
Ware, Mrs. Justin A., on Ladies' Committee . . . . . 75
Ware, Justin A., Resolution of Thanks to Local Committee . 91
Washburn, Lettice R., Elected an Associate Member . . . . 78
Water Power Privilege . . . . 117
Watt, James, Inventor of Mechanical Stoker . . . . . 243
Wattles, F. E., Elected an Active Member . . . . . 78
Webber, Col. Samuel, on Losses in Turbines . . . . . 235
Whitney, Eli, and his Cotton Gin, M. F. Foster . . . . . 152
Whitney, Eli, Tablet proposed to 157
Wilbur, Edward B., Committee on Election of Members . . . 76

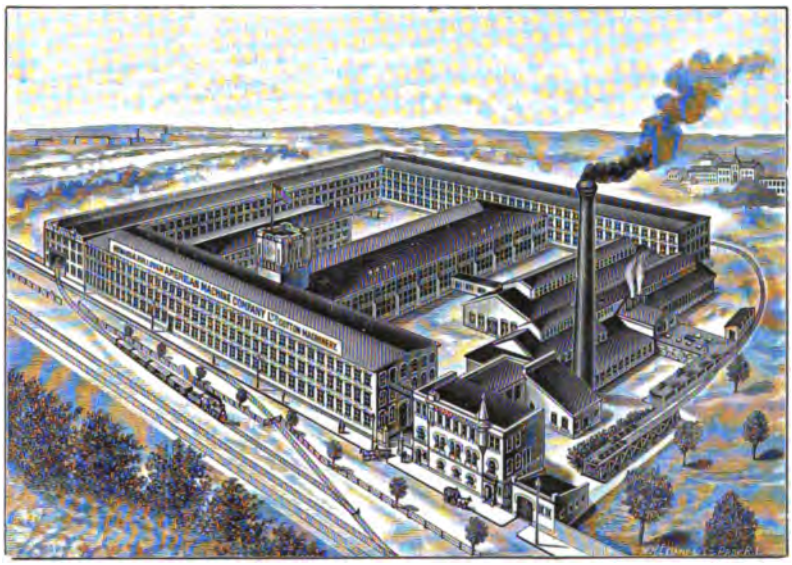
HOWARD & BULLOUGH

# American Machine Co., Ltd.

**PAWTUCKET, R. I.**

BUILDERS OF

# COTTON MACHINERY.



BALE BREAKERS, FEEDERS,
SELF FEEDING OPENERS,
BREAKER, INTERMEDIATE and
FINISHER LAPPERS.

REVOLVING FLAT CARDS,
DRAWING FAMES { with Mechanical or Electrical Stop-motions.
SLUBBING, INTERMEDIATE and
ROVING FRAMES.

NEW PATTERN SPINNING FRAMES.

IMPROVED TWISTERS.

CONE WINDERS.

WE INVITE INVESTIGATION AND COMPARISON.

# KITSON PICKERS

## Have been manufactured on the same old spot for 50 Years,

But all you can recognize in visiting Lowell is the SPOT. There isn't a vestige of the original shop or its equipment remaining.

Everything in the way of spacious buildings, special tools, jigs and templets for constructing this one line of cotton mill machinery strictly on the duplicate system now occupies the old stamping ground, and your inspection of the same is solicited.

## Our Cotton Openers and Lappers

Have become a household word among mill men, North and South. Always "up to date" in improvements and "down to date" in price.

Send for new catalogue of Cotton Preparing and Waste Working Machinery.

---

# KITSON MACHINE CO.,

LOWELL, MASS.

**STUART W. CRAMER, Southern Agent,**
**CHARLOTTE, N. C.**

# Saco AND Pettee Machine Shops

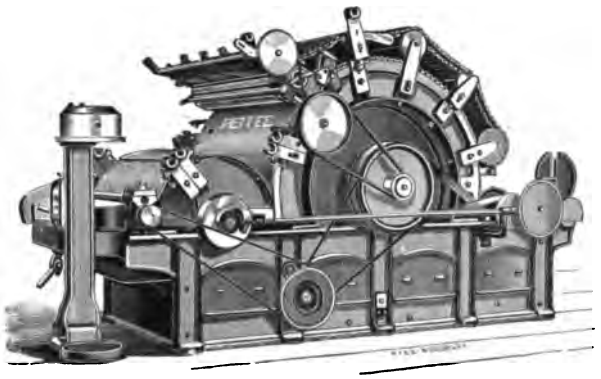
**Main Office: NEWTON UPPER FALLS, MASS.**

---

# COTTON MACHINERY

OF THE

## LATEST IMPROVED PATTERN.

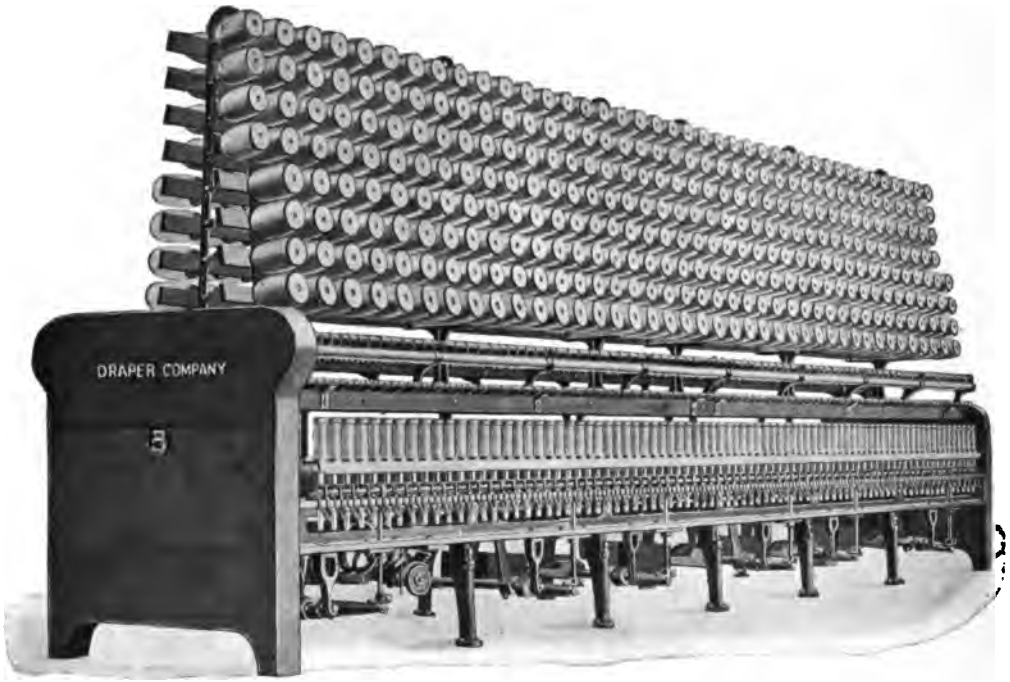


Revolving Flat Cards,
Railway Heads,
Drawing Frames,
Slubbing,
Intermediate and
Roving Frames.
Spinning Frames.

**WORKS: . . .** { **Biddeford, Maine.** / **Newton Upper Falls, Mass.**

☞ Send for estimates and prices.

67—68




# OUR NEW TWISTER.

Made Throughout from New Patterns.

***Extra Weight,*** ***Adjustable Legs,***

***Draper Twister Spindles.*** ***New Patented Details.***

## BUILT FOR SPEED.

The demand for our Twisters steadily increases. We also build Northrop Looms, Warpers, Spoolers, Reels, Banding Machines, Spindles, Temples, Round Spinning Rings, Separators, Etc.

## THE DRAPER CO., HOPEDALE, MASS.

# PHILADELPHIA
# *TEXTILE SCHOOL.*

[PENNSYLVANIA MUSEUM AND SCHOOL OF INDUSTRIAL ART.]

## SIXTEENTH YEAR.

**Instruction Given in All Branches of the Manufacture of Cotton, Wool, Worsted and Silk.**

Complete Modern Equipment for Carding, Spinning, Dyeing, Weaving and Finishing.

**1899.** — Day Classes opened October 2nd; Evening Classes opened October 9th.

Endorsed by leading manufacturers and educators. Send for Illustrated Year Book.

EDWARD W. FRANCE, Director,
Broad and Pine Sts., Philadelphia.

---

# National Ring Traveler Co.,

MAKERS OF STANDARD

# Spinning and Twisting Travelers

OF EVERY DESCRIPTION.

**Belt Hooks, Loom Forks, Saddles and Wire Specialties of all kinds.**

**PROVIDENCE, R. I.**

A. CURTIS TINGLEY, TREASURER.

# Stoddard, Haserick, Richards & Co.

BOSTON, MASS. BRADFORD, ENGLAND.

# Bankers and Importers.

---

*Sole Representatives for*

**DOBSON & BARLOW, Ltd., - - - Bolton.**

Improved Bi-Simplex Carding Engines, with Patent Anti-Flexion Grinder.
Heilman Combs, Single and Duplex.
Ribbon Lap Machines. Sliver Lap Machines.
Slubbers, Intermediates, Rovers and Jacks.
Improved Self-Acting Mules for Cotton.
Gassing Frames and Winders.
SPECIAL Opening and Picking Machinery for Delicate Cottons.
SPECIAL attention given to Medium and Fine Counts.
WORSTED CARDING ENGINES.
WORSTED MULES.

---

**SAMUEL LAW & SONS, Ltd., - - Cleckheaton.**

CARD CLOTHING OF ALL DESCRIPTIONS.

---

**TAYLOR, WORDSWORTH & CO., - - Leeds.**

NOBLE COMBS and BACKWASHERS.

---

**PRINCE SMITH & SON, - - - - Keighley.**

WORSTED DRAWING and SPINNING MACHINERY.
BRADFORD SYSTEM and CONE SYSTEM.

---

**SOCIÉTÉ ALSACIENNE, - - - Mulhouse.**

WORSTED DRAWING on FRENCH SYSTEM.

---

## *EGYPTIAN COTTON*

FROM

**CARVER & CO., - - - - - Alexandria.**

**CARVER BROS. & CO., - - - Liverpool.**

# S. A. Felton & Son Co.,

# Mill Brushes.

FACTORY:
MANCHESTER, N. H.

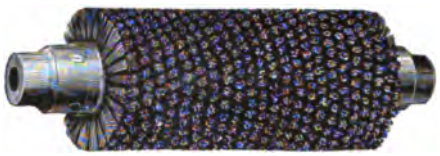
BOSTON OFFICE:
19 HIGH STREET.

---

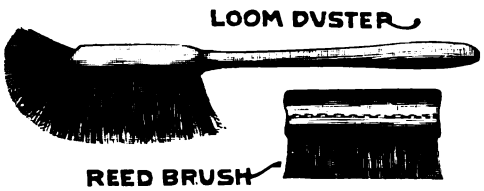
*REVOLVING FLAT CARD BRUSHES*

TO FIT ANY MAKE MACHINE.

*Comber Brush.*



## *PRINT WORKS FURNISHERS.*




**Made by**
**An Improved Method.**

*Bottle Brush.*

***All Kinds of Brushes for Cotton and Woolen Mills.***

Estimates made on Special Work pertaining to Mill Brushes.

# ELIJAH ASHWORTH,

## Manufacturer of Card Clothing.

Bright Hardened and Tempered Steel Wire, Plough Ground or Surface Ground.

**CLOTHING FOR REVOLVING FLAT CARDS A SPECIALTY.**

**All makes of Top Flats Reclothed by Ashworth's Patent Steel Clamp Fastening.**

ESTIMATES PROMPTLY GIVEN.

**HENRY ASHWORTH, Agent, Fall River, Mass.**

---

# EVAN ARTHUR LEIGH,

Successor to E. A. LEIGH & CO.,

**35-36 Mason Building, - BOSTON, MASS., U. S. A.**

IMPORTER OF

## *Textile Machinery, Etc.*

Sole Agent for the United States and Canada for

**PLATT BROS. & CO. (Ltd.) of OLDHAM, ENGLAND,**

By Far the Largest Makers in the World of

**COTTON, WOOLEN AND WORSTED MACHINERY.**

By the use of Platt's Cotton Machinery for either fine or coarse work, a larger production of better quality can be obtained at less cost.

Sole Makers of Brown's Patent Carding Engines for Wool—give woolen yarn a worsted appearance.

New Patent Noble Comb—Increased production, better work.

Special Machinery for making English and French Worsted Yarns.

Special Machinery for making Cotton Waste into Yarns.

Joseph Sykes Brothers' Card Clothing for cotton. Jas Critchley & Sons' Clothing for woolen and worsted. Dronsfield's Grinding Machinery and Emery Filleting.

Also Supplies for the above Machinery kept in stock.

**LOOMS FOR ALL CLASSES OF WORK.**

Mather & Platt's Dyeing and Finishing Machinery.

Archbutt-Deeley System for Purifying and Softening Water.

67—68

# ELECTRICITY

—IN—

# MILLS and FACTORIES.

Has been made a Special Study by our Engineers. The most important factories in this country driven by electricity are equipped with our apparatus.

WEAVE ROOM, PONEMAH MILLS, TAFTVILLE, CONN.
Driven by General Electric Motors Operated by Electricity Transmitted 4½ Miles.

All our Expert Information is available to Mill Engineers and Superintendents.

# GENERAL ELECTRIC CO.

Principal Office, SCHENECTADY, N. Y.

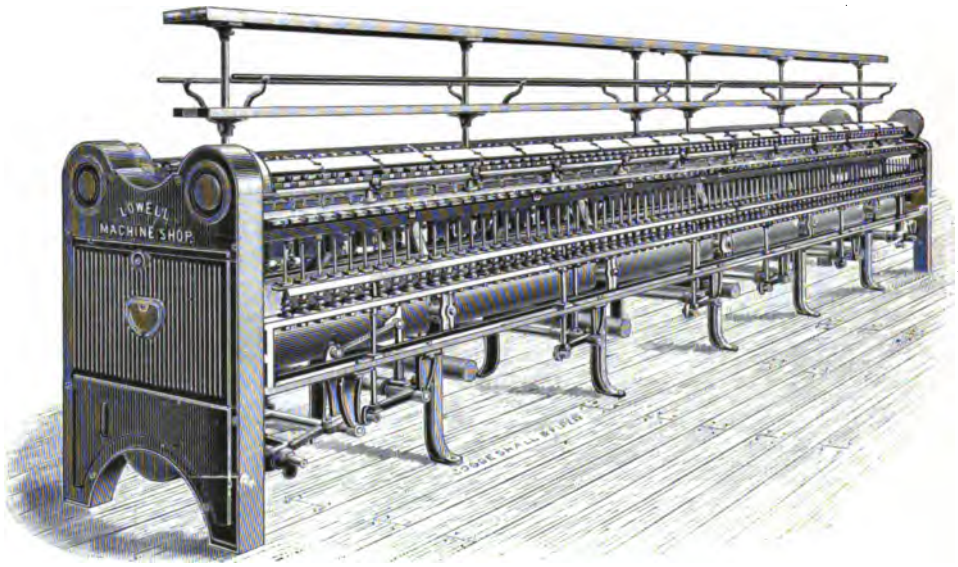
SALES OFFICES: BOSTON, 180 SUMMER STREET.
NEW YORK, 44 BROAD STREET,

AND ALL LARGE CITIES IN THE UNITED STATES.

# LOWELL MACHINE SHOP,

Lowell, Mass.

# Cotton Machinery.




Revolving Flat Cards,
Railway Heads,
Drawing Frames,
Roving Frames,
Ring Spinning Frames,
Twisters, Spoolers,
Warpers, Slashers,
Looms.

---

# WORSTED MACHINERY.

FOR a Fly Frame that will give you a large production at small amount of cost and horse power, go to the WOONSOCKET MACHINE & PRESS COMPANY, Woonsocket, R. I. They also manufacture Cloth Trimmers, Shafting, Hangers, Pulleys, Friction Clutches, &c.

# Plymouth Cordage Co., North Plymouth, Mass.

G. F. HOLMES, Treas.

MANUFACTURE FINEST QUALITY

## ROPES AND BINDER TWINES OF ALL DESCRIPTIONS.

THE RAW MATERIAL.

THE FINISHED PRODUCT.

**BALE ROPE is one of our SPECIALTIES. We are LEADERS in Strictly First Class TRANSMISSION ROPE.**

☞ Send for our Booklet "Manila Rope Transmission." It may be of interest and value to you.

Freight and Telegraph Address :
SACO, ME.

H. P. GARLAND,
Treasurer.

# Loom Picker Co.,

**Manufacturers of**

## Loom Pickers, Loom Harnesses,
## Loom Reeds,
## Ticking Lug Straps,
## Hickory Picker Sticks,
## Picker Loops and Picker Leather.

## Biddeford, Maine.

---

# T. C. ENTWISTLE,

MANUFACTURER OF

## Patent Warping, Balling, and Beaming Machines.

ALSO

**All Kinds of Common Expansion Combs for Warpers, Beamers, and Slashers.**

AND

TRAVERSE WHEEL CARD GRINDERS FOR AMERICAN OR ENGLISH COTTON WOOLEN OR WORSTED CARDS.

## Cor. Market and Worthen Streets, - LOWELL, MASS.

---

**COTTON MILLS**

By utilizing the waste heat from your flue gasses you are enabled to heat your feed water considerably above boiling point. You can use the most economical condensing auxiliary pumps, with a maximum waste of exhaust, having hot feed water from the economizer. You can use the hot water for heating your mill successfully. You can make a SAVING in fuel of 12 per cent. to 20 per cent. You can make a saving in repairs to your boilers. You can increase the efficiency of your plant. HOW? By using a *Green's Economizer.*

**A RECORD:**
**30,000,000 H. P. IN USE.**

**SAVE FUEL** BY USING

**GREEN'S ECONOMIZER.**

SOLE MAKERS IN THE U. S. A.

**The Green Fuel Economizer Co.,**
**MATTEAWAN, N. Y.**
**BOSTON, 53 State Street.**
**NEW YORK, 74 Cortlandt Street.**

**Bleach and Dye Works**

By using the hot water from the economizer in your kiers and vats you can save 12 per cent to 20 per cent. in FUEL. You can save 20 per cent. in TIME in the boiling process. You need never run short of steam. You can have hot feed water for your boilers as well as hot water for your DYE HOUSES. You can do better work with less waste. Less complaint from your Dyer about not having enough steam, and less grumbling from your engineer that the Dye House is using all the steam with general satisfaction all around. HOW? By using *Green's Economizer.*

ESTABLISHED 1854.

## *Thomas Mayor & Son,*

# BODDEN FLYERS,

**Re-arrangement of Machinery for Fine Work.**

Over 200,000 Mayor's Improved Bolsters and Flyers applied to old frames.

**General Repairs on Roving Machinery.**

**Pressers for Bodden Flyers always in stock.**

PROVIDENCE, R. I.

---

## The American Correspondence School of Textiles

GIVES

COURSES OF INSTRUCTION BY MAIL,

**In Cotton Picking, Carding, Spinning, Warp Preparation, and Weaving, Mill Calculations, Mill Engineering and Textile Designing.**

Printed Lessons, complete and up to date.
Send for Free Catalogue.

C. P. BROOKS, Director,
New Bedford, Mass.

---

## The Equipment of

## THE NEW BEDFORD TEXTILE SCHOOL

New Bedford, Mass.

Consists of Atherton, Crompton, Dobson & Barlow, Draper, Easton & Burnham, Entwistle, Hetherington, Howard & Bullough, Kilburn-Lincoln, Knowles, Mason, Pettee, Providence, Saco, Stafford, Whitin, Woonsocket, and other machinery.

*NOW OPEN FOR STUDENTS.*

Send for Free Catalogue to

C. P. BROOKS,
Managing Director,
New Bedford, Mass.

---

# American Cotton Yarn Exchange,

## Combed and Carded Cotton Yarns

From Northern and Southern Mills.

American, Egyptian, Peruvian and Sea Islands.

ARNOLD B. SANFORD, PRES. AND GEN. MGR.

NO. 67 CHAUNCEY ST., BOSTON, MASS.

Long Distance Phone, No. 1120 Oxford.

# Inspection. Protection.

J. M. ALLEN, President.

W. B. FRANKLIN, Vice-President.

F. B. ALLEN, 2d Vice-President.

J. B. PIERCE, Sec'y and Treas.

---

## *Northeastern Department,*

C. E. ROBERTS, - - - Manager,

125 MILK STREET,

BOSTON.

# WILLIAM FIRTH,

—IMPORTER OF—

# TEXTILE MACHINERY,

**67 Equitable Building, 150 Devonshire St., Boston, Mass.**

—SOLE IMPORTER OF—

## Hetherington's Patent Revolving Top-Flat Carding Engines,

**Combing Machines, Drawing Frames, Roving Frames and Self-Acting Mules.**

Curtis Sons & Co., Patent Worsted Card, Woolen Cards and Mules.

John Perry, Ltd , Worsted Machinery on French and English Systems, and Special Machinery for Silk and Ramie Fibre.

Wm. Tatham & Co., Vulcan Works, Rochdale, England, Makers of Waste Machinery for Working Hard and Soft Waste, Cop Bottoms, Etc.

James Yates & Son, Hardened and Tempered Steel Card Clothing for Woolen and Worsted Goods.

George Orme & Co., Patent Hank Indicators.

## JOSEPH STUBBS,

—MAKER OF—

**Patent Quick Traverse Gassing Frames for Cotton, Worsted, and Silk Yarns; Yarn Preparing Machines; also, Patent Adjustable Yarn Clearer for Winding Frames.**

**Southern Office, 40 South Forsythe St., Atlanta, Ga.** **C. E. W. Dow, Representative.**

67—68

# The Philadelphia Commercial Museum

**DR. WILLIAM P. WILSON, Director.**

SUPPLIES DETAILED, SPECIFIC INFORMATION concerning the TRADE CONDITIONS of the WORLD'S MARKETS.

It tells WHERE THE MARKETS ARE and by whom supplied. Who the RESPONSIBLE BUYERS ARE and HOW TO REACH THEM.

It can ascertain FOR YOU the particular REQUIREMENTS of any or all markets in THE LINE OF GOODS YOU MAKE.

It has inaugurated a most valuable method of REGISTERING AMERICAN MANUFACTURERS in Foreign Countries by means of

**CARD INDEX FILES**

PLACED IN THE CHAMBERS OF COMMERCE IN FORTY-FIVE OF THE PRINCIPAL COMMERCIAL CENTERS OF THE WORLD.

This is a movement in the Interest of American Commerce with which YOU SHOULD BE IDENTIFIED.

Write for particulars to

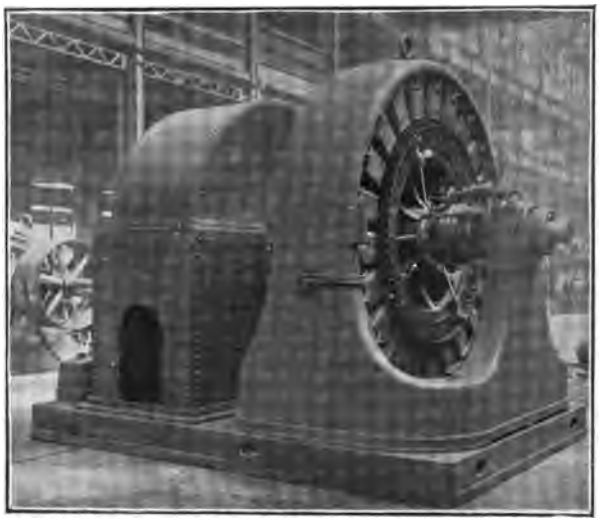
**THE PHILADELPHIA COMMERCIAL MUSEUM,**

**233 SOUTH FOURTH STREET, PHILADELPHIA, PA.**

67

# Westinghouse
# Polyphase System

The Best for



Factory and Mill Service.

Polyphase Generator Direct Connected to Pelton Water Wheel.

## Our Type "C" Motor.

More in Use Than All Other Makes of Induction Motors Combined.

No Fire Risk.

No Moving Contacts.

Type "C" Induction Motor.

# Westinghouse Electric
## and Mfg. Co., Pittsburg, Pa.

Westinghouse Electric Co., L't'd.,
32 Victoria St., London.

And all Principal Cities in United States and Canada.

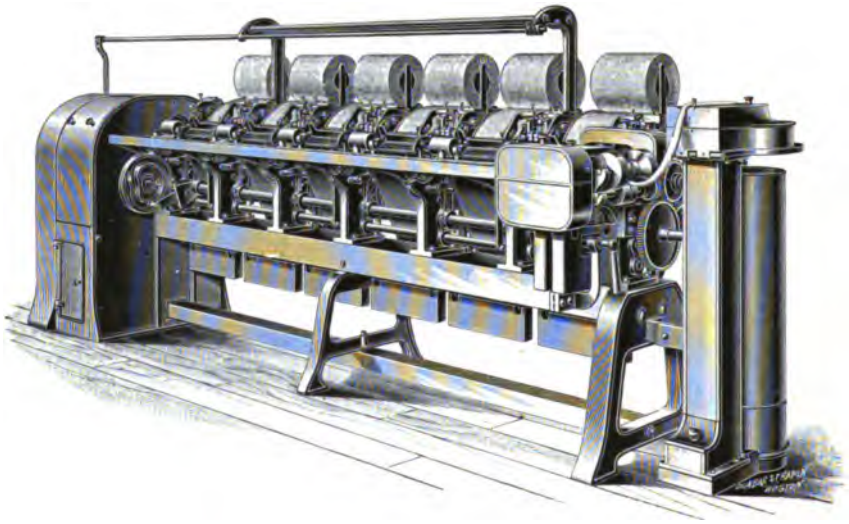
303A

# MASON MACHINE WORKS,

## TAUNTON, MASS.,

——BUILDERS OF——

# COTTON MILL MACHINERY.



MASON COMBER.

REVOLVING FLAT CARDS, 40 and 45 Inch.
COMBERS, SLIVER and RIBBON LAP MACHINES.
RAILWAY HEADS and DRAWING FRAMES.
SPINNING FRAMES, for Coarse or Fine Yarns.
MULES, for Coarse or Fine Yarns.

**Over 2,000,000 Spindles of MULES Built to Date.**

LOOMS IN GREAT VARIETY, PLAIN OR FANCY.

*Also, THE MASON NORTHROP LOOM.*

---

**Southern Agents, THE D. A. TOMPKINS CO, Charlotte, N. C..**

# "Unrolls Like a Carpet."

THE

# AMERICAN COTTON COMPANY'S

# ROUNDLAP BALE,

besides its many other economies, saves the first processes of cotton manufacture.

It unrolls directly into the lapper, and dispenses with the ordinary operations of opening and mixing.

It occupies but 55 per cent. of the warehouse space, weight for weight, taken up by the square compress bale, the expense of handling is less than that of the latter and the elements of risk and waste from loose cotton, always present with square bales, are removed.

Someone has well named it the Salamander bale. It is almost fireproof and reduces the fire hazard to the minimum. The air having been compressed from the bales, fire cannot strike in, and goes out for lack of something to feed on. Roundlap bales are also impervious to water.

The fibre of Roundlap baled cotton is stronger, the cotton cleaner than square baled and the tare is only 1 per cent.

Every bale is plainly marked and is accompanied by a guaranteed sample. Further information as to machinery or cotton will be supplied on application to the American Cotton Company.

Roundlap bales can be bought of The American Cotton Company in New York or of any of its agents, or they can be purchased by any cotton buyer or by any mill at the gin plants, a complete list of which will be furnished on application.

## THE AMERICAN COTTON COMPANY.

Capital, - - - $7,000,000.

**General Offices, 27 William St., New York City.**

JNO. E. SEARLES, President, New York.
WM. C. LOVERING, Vice-President, Boston.
WINTHROP M. TUTTLE, Treasurer, New York.
GEORGE W. OAKLEY, Secretary, New York.

E. A. SMITH, PRESIDENT. J. P. WILSON, SEC'Y AND TREAS.

# THE CHARLOTTE SUPPLY COMPANY,

## GENERAL MILL FURNISHERS

.....And Manufacturers of Leather Belting.

CHARLOTTE, N. C.

---

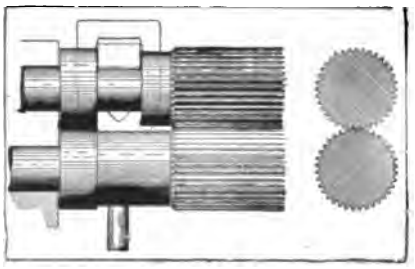
# The Metallic Drawing Roll Co.

—— SOLE MANUFACTURERS OF ——

# Patent Metallic Rolls

FOR FIBROUS MATERIALS.

**25 Per Cent. More Production Guaranteed, at Less Cost.**



Applied to any make of machine, new or old, and successfully on the following Carding Room Machinery:

Coiler Railways.
Sliver Lap Machines.
Comber Draw Box.

Drawing Frames, with Electric or Mechanical Stop Motion.

Slubbers.
Intermediate Frames.

WRITE FOR PRICES AND PARTICULARS TO

**THE METALLIC DRAWING ROLL CO., Indian Orchard, Mass.**

---

# Providence Engineering Works,

## PROVIDENCE, R. I.

Successors to PROVIDENCE STEAM ENGINE COMPANY, also to RICE & SARGENT ENGINE COMPANY, for U. S. A.

**Having acquired the sole right to manufacture**

**RICE & SARGENT ENGINES, and IMPROVED GREENE ENGINES,**

**We are in position to meet all requirements as to Economy, Regularity of Speed, Strength, and Durability. Send for quotations.**

DAVID S. JOHNSTON, Treas. JEROME GARLAND, Mgr.

THE

# Cohoes Iron Foundry and Machine Co.,

COHOES, N. Y.

— MANUFACTURERS OF —

## Cylinder and Hot Air Slashers.

The Cylinder Slashers are made with One Cylinder, Two Cylinders or Three Cylinders each, and can be made with One, Two or Three Size Boxes, for Plain or Colored Work. . . . . .

We also make a Slasher with a Headway to accommodate Two Loom Beams at the same time, which is very desirable for a large production of Print Cloth or for Very Fine Yarn. . . . . .

## Size Tanks, Tramways and all Slasher-room Necessities.

In addition to our Slasher Work, we make Elevators and Snow's Improved Water Wheel Governors. Also repairs for the Parr, Curtis & Madeley Mules, and the John Mason Frames. . . . . .

# Crompton & Knowles Loom Works

**WORCESTER, MASS.**

GINGHAM LOOM.

—— BUILDERS OF ——

## Plain and Fancy Cotton Looms.

**Branch Works, - - Providence, R. I.**

**And Weaving Machinery for Every Kind of Textile Fabric.**

ALSO MAKERS OF

## Dobbies and Jacquards.

PLAIN COTTON LOOM.

---

**AN INTELLIGENT AND CAREFUL**

## INSPECTION

**IS THE BEST**

## PROTECTION.

# Mutual Boiler Insurance Company

## *OF BOSTON.*

**POLICIES COVER DAMAGE TO PROPERTY AND EMPLOYEES.**

Specifications Given for Boilers and Settings.

**DIRECTORS.**

EDWARD ATKINSON, GEO. W. WHEELWRIGHT, CHAS. F. FAIRBANKS,
J. W. FARWELL, HARCOURT AMORY, A. B. SILSBEE,
A. M. GOODALE, HERBERT LYMAN, JAS. S. MURPHY,
MOSES WILLIAMS, JR., ROBERT BATCHELLER, JOHN C. COBB.

EDWARD ATKINSON, President. D. W. LANE, Secretary and Treasurer.
R. S. HALE, Consulting Engineer.

**Telephone, 443 Boston** **31 MILK STREET, BOSTON.**

66—67

INCORPORATED JUNE 4 1890.

# American Card Clothing Co.

GENERAL OFFICES: Worcester, Mass.

**SEND ORDERS TO FACTORIES:**

**Worcester, Leicester, North Andover, Lowell, Walpole, Mass., Philadelphia, Pa. Providence, R. I. Manchester, N. H.**

## Manufacturers of Every Description of CARD CLOTHING.

Special attention given to Clothing for Revolving Top Cards. Experts furnished to Clothe and Start the same.

Hardened and Tempered Steel Wire Card Clothing. Plough Ground or Surface Ground. Revolving Top Flats covered and fastened with Steel Clips.

**Southern Branch Office, Durham Block, Charlotte, N. C.**

A 28
A 86 C

# TRANSACTIONS

OF THE

## New England

# COTTON MANUFACTURERS' ASSOCIATION.

Founded April 20, 1865. Incorporated Dec. 1, 1894.

NO. 67.

---

# SEMI-ANNUAL MEETING.

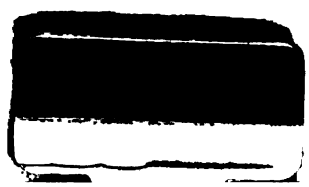
**Held at Windsor Hotel, Montreal, P. Q., Canada,**

OCTOBER 5-6, 1899.

---

Office of the Association:

Room 57, International Trust Building, 45 Milk Street,
Corner of Devonshire St., Boston, Mass.

WALTHAM, MASS.:
PRESS OF E. L. BARRY.
1899.

UNIVERSITY OF MICHIGAN
3 9015 06717 4402